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No. - .

In the

Supreme Court of the United States.

OCTOBER TERM, 1983.

RAYTHEON COMPANY,
PETITIONER,

v.

ROPER CORPORATION,
RESPONDENT.

Appendix B.

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BATEMAN & SLADE, INC. BOSTON, MASSACHUSETTS

PETITION FOR WRIT OF CERTIORARI TO THE
UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

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UNITED STATES DISTRICT COURT

DISTRICT OF MASSACHUSETTS

RAYTHEON COMPANY,

Plaintiff

V. Civil Action

80-2035-MA

ROPER CORPORATION,

Defendant

OPINION

Mazzone, D.J.

January 20, 1983

STATEMENT OF THE CASE

This is a patent declaratory action brought by Raytheon Company (Raytheon)

against Roper Corporation (Roper). Raytheon seeks a declaratory judgment that Roper's U.S. Patent 4,028,520 ('520 patent) entitled "Air Flow System for Common Cavity Microwave Oven" is invalid. 1/ The inventor is Sumner H. Torrey. Roper has denied that its patent is invalid and has counterclaimed for patent infringement. Jurisdiction is properly invoked under 20 (sic) U.S.C. §§1338(a), 2201 and 2202. Venue is proper under 28 U.S.C. §1400.

Specifically, Raytheon claims that the '520 patent is invalid because (1) it lacks utility, a requirement of 35

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1. A second Roper patent, U.S. 4,028,519 was originally involved in this suit, but has been withdrawn by the parties.

U.S.C. §101; (2) it is obvious, 35 U.S.C. §103; and (3) it lacks an enabling disclosure and fails to particularly specify the invention, as required by 35 U.S.C. §112. Raytheon also seeks attorneys' fees under 35 U.S.C. §285. Roper answers that its '520 patent is valid and further counterclaims that Raytheon has deliberately and willfully infringed its '520 patent.

The case was tried to the Court without jury. The order of trial was reversed by the Court and Roper, the patentee, presented its case first on the issues of validity and infringement. The issue of damages was reserved for a later hearing, if necessary. The record consists of the trial testimony, various depositions and numerous exhibits. Pursuant to Fed.R.Civ.P. 52(a), I make

the following findings of fact and conclusions of law. [2/]

I. FINDINGS OF FACT

Background of the Case

The subject matter of this suit is a "common cavity" oven with a pyrolytic self-cleaning feature. This common cavity oven has the capacity, in the same oven structure, to perform conventional thermal cooking (i.e., baking, broiling), microwave cooking, and combination

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2. My conclusion that the patent is non-operative and, therefore, invalid, is dispositive of this case. However, given the efforts of counsel in presenting this extensive record and mindful that a final resolution of the case is desirable, I have set out my findings and conclusions in a more extended fashion to allow an appellate court to examine all of the issues raised by the pleadings.

thermal and microwave cooking. The oven also self-cleans by heating the walls to about 900°F. to break down the soil baked on the walls, so as to pyrolize it.

In sum, the oven is designed to perform every cooking method and self-clean as well. It provides conventional thermal cooking together with the advantages of rapid and efficient microwave cooking. At the same time, it provides for crisping and browning which is not always possible with microwave cooking alone. Pyrolytic self-cleaning, the third feature, is practically effort free to the consumer, as contrasted with continuous cleaning which requires that the decomposed material on the oven walls be wiped off and removed manually by the consumer.

These three functions are not totally compatible. Thermal cooking

requires only minimal amounts of air and ventilation has usually been accomplished by providing a gap or opening in the oven door to let air enter and flow upwardly through the oven and out a vent located at the top of the oven by natural convection.

In a microwave oven, microwave radiation provides the energy that cooks the food. The microwave radiation is absorbed by the food and cooks it from the inside rather than the outside, as is the case in conventional thermal cooking. The radiation is supplied by a microwave feed unit. The unit includes a magnetron which generates the radiation and an antenna that transmits it to the oven. The radiation travels from the magnetron to the antennna through a hollow metal tube called a waveguide. The magnetron has fins projecting from its housing to

help dissipate heat. A fan or blower is provided to move air through the magnetron fins and the power supply to cool them from the substantial amount of heat generated in the process.

Microwave cooking produces more moisture because of its speed and process. This moisture must be removed from the oven, and in the conventional countertop or separate microwave oven, the moisture is removed by a blower or fan which is located in the microwave component area and blows the vapors and gases out a vent in the top of the oven. Microwave cooking also requires maximum sealing of the oven cavity to prevent escape of microwave energy through gaps in the oven structure.

The third feature, the self-cleaning feature, is an additional complicating factor. Self-cleaning is done without

oxygen, but some air is needed to flush out the smoke and volatile products of the pyrolytic process. This smoke will flow out any available opening including backwards through the opening in the waveguide. If excess air enters, with the extremely high temperature and possibly volatile gases, especially if the oven is very dirty, combustion may occur in the oven cavity. This combustion is known as autoignition, and produces sudden pressure within the oven which also seeks release through any opening, including the waveguide. The products of this combustion could enter the waveguide and the microwave unit components. If the autoignition were fueled by even greater amounts of excess air, fire inside the cavity could result or even an explosion sufficient to force open the oven door. This case involves

the combination of these cooking cleaning modes. Self-cleaning called for the microwave feed system to be sealed to prevent possible fouling. Sealing the system meant inadequate ventilation for microwave cooking. The other possibility was to provide forced air for moisture-free microwave cooking, and either giving up self-cleaning or risking fouling by autoignition. This patent claims to have resolved this dilemma.

The Prior Art and Its Teachings

The relevant art encompassed the fields of microwave ovens, combination microwave and thermal ovens, and pyrolytic self-cleaning ovens.

Self-cleaning, common cavity ovens were first marketed by General Electric in the mid-1960's. Its first model was called the "Versatronic." That model was followed by the "Superstove" model which

came on the market in the mid-1970's. In the early 1970's, Litton Industries also introduced a self-cleaning common cavity oven. Both of these ovens sealed off the microwave system to prevent fouling and, therefore, did not have forced air. Steam and moisture accumulated in the cavity during microwave cooking, presenting discomfort and perhaps a mild danger to the user when the oven door was opened after cooking was completed, especially after cooking a high-moisture product. Both General Electric and Litton felt this discomfort or danger was sufficiently worrisome to require a warning to their customers in their product manuals.

Other teachings in microwave cooking included the Boehm patent, No. 3,440,386, which taught that convected air through gaps in the door was not sufficient to

remove steam and adequately ventilate the oven. Boehm taught that the microwave mode could be ventilated properly by forcing air into the cavity with fans. This required that the microwave feed system be open and, therefore, subject to fouling. Boehm also taught that the magnetron, the tube which generates the microwave, becomes hot during microwave cooking and must be cooled. Cooling is accomplished by using a blower directing air over the magnetron. This same air can be directed into the oven cavity to ventilate it. This same arrangement is present in French, (sic) Patent No. 1,249,130. Both the Boehm and French patents required that the end of the microwave feed system be open to the oven cavity and, therefore, vulnerable to contamination by backflow. And both patents point out that contamination is

undesirable because it adversely affects the oven's performance. Neither Boehm nor French included the pyrolytic self-cleaning feature.

Pyrolytic self-cleaning creates smoke and other by-products, some of which can be carbon. The teachings in this area introduced air to the oven cavity by convection during self-cleaning. Hurko, Patent No. 3,121,158 pointed out the undesirability of the presence of carbon especially when autoignition occurs. While autoignition does not always occur, Hurko taught the criticality of limiting the amount of air allowed to enter the cavity. The Lewis patent, Patent No. 3,348,023, created a gap in the door gasket to provide an air inlet to ventilate the cavity. It was also known from Long, Patent No. 2,961,520, that microwave energy

could be supplied to the microwave oven cavity from the bottom of the cavity.

The prior art also included variations on the foregoing which will not be set out here. Generally, the prior art can be summarized as follows:

(1) Microwave ovens utilized forced air from a blower which cooled the magnetron and flowed into the oven cavity to ventilate it.

(2) Pyrolytic self-cleaning allowed naturally convected air to enter the oven capacity during self-cleaning through a gap or some other aperture, usually in the door structure.

(3) Microwave energy was supplied from below the oven cavity.

(4) To prevent contamination of the microwave feed system by autoignition and backflow, the end of the system was sealed.

The prior art did not teach any combination of microwave and conventional ovens which utilized forced air through the microwave system and had a pyrolytic self-cleaning feature. The prior art said the microwave energy source would be contaminated if placed below the oven cavity. Because sealing the microwave feed system to prevent contamination meant the cavity was not adequately ventilated, steaming and moisture was a marketing problem in the self-cleaning common cavity oven.

The problem was of different proportions to the concerned parties. To the home economist who was concerned with the marketing of the product, the problem of steaming was a critical one which called for customer warnings and engineering improvement. To the

engineer, the problem was less critical, if indeed, it existed at all.

A person of ordinary skill in this field was aware of the efforts to develop an effective, safe and commercially acceptable common cavity oven with pryolytic self-cleaning. Raytheon and Roper both employed people skilled in the art of designing ovens for cooking food in both microwave and thermal modes. Their staffs were comprised of graduate engineers with substantial background and experience in the design, development and marketing of ovens. Those people were all knowledgeable of the prior art, were aware of the incompatibilities of the modes, and were continually engaged in research and development of self-cleaning common cavity ovens.

Development of the Roper Oven

Roper is a designer and manufacturer of ovens. In 1973, at the urging of Sears Roebuck and Company, it began to work on a common cavity, self-cleaning oven. Roper was seeking a product which would be competitive with, if not better than, the General Electric common cavity ovens. At that time, General Electric had the major share of the market.

Sumner H. Torrey, was assigned to the project. Research was conducted at Roper's plant in Kankakee, Illinois, and at its appliance research center at Purdue University in Lafayette, Indiana, called the Purdue Research Center.

Roper conducted tests of all available ovens then on the market and noted the deficiencies in performance, such as energy loss, uneven cooking, and steaming. Torrey had a staff of 3 or 4

engineers who worked on the project with him. One of those engineers was Buddy J. Austin. Austin worked closely with Torrey and worked especially on the development of the antennna and circuitry. In February, 1976, Austin was a co-applicant on a patent application for the Roper common cavity antenna, No. 4,028,021.

In addition to its own internal research, Roper contracted with Beverly D. Kumpfer, of American Microwave, Inc. as a consultant. Kumpfer made many helpful suggestions to Torrey and delivered a prototype oven to Roper to continue the design research. Their combined efforts were directed to a bottom location, as well as improved cavity ventilation. They were also concerned with microwave leakage and worked on a better door seal as well as a

microwave "choke," a construction of the door which further inhibited leakage. Chokes were utilized on some microwave ovens examined by Roper. Also, some models used a small gap in the door seal to admit air for ventilation purposes. Eventually, Roper settled on a continuous door gasket without the gap that allowed convective air into the cavity. This design meant the microwave feed system was the only intended entry through which air could enter the oven cavity.

Torrey proceeded to design a further prototype, using a Roper self-cleaning oven. With Kumpfer's assistance, he located the microwave system in the bottom, and used a blower to cool the magnetron and force air into the cavity during the microwave mode. He tested the model in the self-cleaning mode, using 6 ounces of butter, and, to his surprise,

he found no problems; that is, he noticed no visible contamination of the microwave feed system and concluded that there was no backflow. There was also adequate ventilation. Torrey believed he had now reconciled all the features.

Air to remove microwave cooking moisture was provided by forcing air through the microwave system into the cavity. The door seal was gap-free to prevent the microwave energy escape which produced less efficient and uneven cooking results. By turning off the blower and allowing naturally convected air to enter through the same microwave system entry now located on the bottom of the structure, the venting requirements of thermal cooking were satisfied. At the same time, this air flow system appeared to prevent the backflow into the

microwave feed system which would result in fouling the system.

In addition to reconciling these two modes, Torrey added the third mode, pyrolytic self-cleaning. This mode required the control of air intake to prevent autoignition. Torrey claimed the entry of air was limited by the openings in the waveguide and the naturally convected air allowed to enter and flow through the oven provided the air required for thermal cooking, prohibited backflow, and protected against autoignition. Torrey claimed the flow of air for microwave cooking was within the range of 3 to 8 c.f.m. when the blower was on and the flow of convected air for baking and self-cleaning was within the range of 0.5 to 2 c.f.m.

In sum, Roper claimed this invention did not require the choice of pyrolytic

self-cleaning at the expense of forced ventilation through the microwave feed system. This invention provided forced ventilation for microwave cooking and a pyrolytic common cavity oven which could be properly and efficiently ventilated if the microwave feed system was located below the oven cavity and an air path was provided for naturally convected air up into the cavity for sufficient venting during thermal cooking and self-cleaning.

In January, 1976, the Roper oven was demonstrated for the first time at a trade show in Dallas, Texas. The industry was now aware that Roper had entered the field with its own product. In February, 1976, Roper applied for a patent for its "Air Flow System For Common Cavity Oven."

In the summer of 1976, Roper's oven was marketed nationally under its own

name and by Sears, Roebuck & Company under its Kenmore label. Since then, about 24,000 of these ovens have been sold, 70% under the Kenmore label. There have been no complaints with the performance of the Roper oven insofar as steaming or contamination of the microwave feed system is concerned. The Roper self-cleaning, common cavity oven was and is a successful product.

Development of the Raytheon Oven

Raytheon began to work on a common cavity oven in early 1975, later than Roper. Its ovens were designed by its staffs located at Caloric and Amana, two of its subsidiaries, as well as at its own New Product Center in Waltham, Massachusetts. Raytheon was also seeking a product to be competitive with General Electric's oven.

Its initial prototype, developed in December, 1975, had a fan in the rear wall which also acted as a microwave antenna. The microwave power supply and magnetron were sealed below the oven and a waveguide was run up the back of the oven to the fan antenna. The microwave pattern provided by this system proved unsatisfactory for cooking. Raytheon also insisted that it maintain a high power wattage of 600° to 700° F. (sic) in its microwave cooking mode. There was also a serious steaming problem during the microwave cooking mode which continued to February, 1976, when the prototype was sent to Caloric and Amana for further development.

In late January, 1976, Buddy J. Austin, one of the engineers on Torrey's staff at Roper, left Roper and went to work for Raytheon at its Amana

subsidiary. Thereafter, he worked with other Raytheon engineers on the development of Raytheon's self-cleaning common cavity oven. Austin was able to identify most of the problems in Raytheon's development program. He had not only worked closely with Torrey, he had also worked on the microwave power supply and its construction, co-signing the aforementioned patent application. There followed several other developments at Raytheon, with which Austin had some familiarity. 3/ In April, 1976, Raytheon began to force air through its microwave feed system and the steaming problem was solved in microwave cooking. Then, also

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3. There is no suggestion that Austin acted improperly or unethically in moving to Raytheon's employ and assisting in the development of Raytheon's oven. Rather, it goes to show familiarity with the Roper-Torrey developments and, if credited, is evidence of copying.

in April, 1976, the Raytheon prototype oven was tipped over on its back during an experiment, thereby placing the microwave antenna in the bottom of the oven. This resulted in a satisfactory microwave pattern and the cooking results were satisfactory. Raytheon's oven was now ready for marketing.

Raytheon's oven had started with a microwave feed system running up the rear of the oven, and with no forced air into the oven cavity through the microwave mode. After an additional adjustment which simply increased the amount of air needed to vent the oven, Raytheon now had the same arrangement as contained in the Roper oven. The Raytheon oven now had a bottom microwave feed system, forced air through the microwave system to vent the oven, just as in the Roper oven. Similarly, there was no steaming problem

and there was no fouling. The Raytheon oven was both structurally and operationally similar to the Roper oven.

The differences remaining did not materially affect the operation of the oven. The air inlet for Raytheon's oven was in the bottom front; while the Roper air inlet was in the bottom rear. The Raytheon oven door seal retained the "gap," while Roper's oven had a continuous door seal. This difference is not significant. Most of the air for the ventilation comes from the microwave system, only slight amounts being admitted through the Raytheon gap. This air does not affect the operation of the Raytheon oven in any material way. Even the Roper door seal is not a perfect seal and admits some air. A third difference is that Raytheon has more than one constriction in its air passage system.

However, it is the concept that limiting air through the system that matters. The Roper claims do not teach only one constriction. Similarly, Raytheon's insistence on its high power wattage of 600° - 700° F. (sic) would not materially affect the operation of the system. In every material respect, the Raytheon oven is a copy of the Roper oven.

Proceedings in the Patent Office

The application for patent was filed on February 26, 1976. Roper was the assignee. The references cited referred to microwave ovens alone (Long - No. 2,860,026; Long - No. 2,961,520; Fukuda - No. 3,470,942; and Fitzmayer - No. 3,626,135), conventional thermal ovens (Eff - No. 3,367,316), common cavity ovens without self-cleaning (Fitzmayer - No. 3,172,987), or self-cleaning with microwave (Maitenaz -

No. 3,962,561). Roper also cited the Boehm and French patents. There was no mention of the General Electric or Litton common cavity, self-cleaning ovens.

A test of the Roper oven was conducted by Underwriters Laboratories on July 2, 1976. Underwriters Laboratories is an independent, non-profit organization testing for public safety. The test consisted of placing 8 ounces of beef suet into the oven and operating it for self-cleaning. There was smoke evolution from the microwave assembly openings. Vapors within the microwave asembly ignited once with a flash, but there was no continuous burning. The results of this test were not provided to the Patent Office.

In summary, it was the object of the invention to provide a common cavity oven for every cooking mode as well as

expelling decomposition products during the self-cleaning mode. It was a further object of the invention to provide a ventilation system which resisted autoignition or explosion, and backflow, and, therefore, contamination of the power supply housing and waveguide.

Claims 1, 2, 5 and 7 claim to prevent autoiginition. Claims 1, 3 and 4 claim to prevent backflow. Claim 6 claims to preclude the escape of microwave energy.

The claims were allowed by the patent exminer without change or comment. The patent in suit was issued on June 7, 1977.

Miscellaneous Findings

Both parties conducted extensive tests in preparation for this case. [4/] Torrey compared and tested the Caloric oven against the Roper oven. His tests showed there was no smoke during autoignition and, therefore, no backflow in both ovens. Roper also obtained three Roper waveguides which had been in use in customers' homes for over six years. Those waveguides were inspected and showed no visible fouling or contamination.

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4. The test will not be described here, but the Roper tests and standards are recorded in Exhibits #73, #74 and #75. The Raytheon tests are recorded in Exhibits #271, #272 and #273. As can been seen from those exhibits, many of the tests were similar, although the observations were not.

Another Roper trial expert, Norman Kirschke, inspected both the Roper waveguides as well as some Caloric waveguides and concluded neither were fouled or contaminated. While all backflow may not be entirely eliminated, Roper says the practical effect of these tests and and the proof of its patent's validity, is that there is no significant backflow and there is no fouling or contamination.

Raytheon, in turn, submitted the Roper oven to various tests arranged and observed by Bohdan Hurko, a long-time employee of General Electric and, Raytheon's expert witness at trial. Hurko was the inventor of the Hurko patent, U.S. Patent No. 3,121,158, and has over 50 patents issued. He has had extensive experience with self-cleaning ovens.

The tests arranged by Hurko included a duplication of the single Torrey test as well as other tests generally used by Underwriters Laboratories. While these tests were not typical of normal use, they were all within the capabilities of the oven and, therefore, were a fair test for the presence of backflow and waveguide fouling. They are also tests required by Underwriters Laboratories before they certify the product for home use. Some of the tests were also run on the Caloric oven which is the subject of the infringement charge by Roper. In every test of the Roper oven, backflow in the form of smoke was clearly observed. In certain of the tests, the smoke was very noticeable. Where smoke was not readily discernible, evidence of backflow was provided by the movement of tissue paper strips placed over the waveguide

opening. The temperature charts supported the instances of autoignition. An examination of the waveguide after these tests revealed no deposits, and, therefore, no fouling.

Hurko maintained that even if smoke were not observed, there was still backflow in small amounts in the system which was dispersed inside the waveguide. Moreover, since the pressure of autoignition ranged up to 10 pounds p.s.i. and the convected air was limited to 0.5 to 2 c.f.m., Hurko stated backflow can occur at any time when the autoignition pressure is more than one pound p.s.i. In any event, Hurko says, despite the presence of backflow, it is simply not a problem.

Further, another Raytheon expert, Bernard Weiss, also inspected the Roper oven. It was his opinion that the Roper

oven does not prevent backflow into the waveguide and fouling. However, while this backflow might absorb energy, it has no effect on the operation and it burned off when the microwave mode is used. Weiss also inspected the three Roper waveguides and claimed he detected a film or light layer of film on them, but attached no significance to it because backflow presented no problems. It is not surprising that the waveguide showed no visible fouling. First, autoignition occurs rarely, about 6 times a year, and secondly, it is accompanied by short puffs of smoke, lasting only a second or two.

Thus, the experts on both sides are in sharp conflict. Raytheon's experts claim there is backflow and still no fouling in both Caloric and Roper ovens. Roper's experts claim there is no

backflow in both, Roper and Caloric ovens) and, therefore, there is no fouling.

I find that the Roper oven does not prevent backflow of air into the waveguide regardless of the temperature achieved within the oven cavity. It is clear to me that the gentle pressure of natural convection cannot and does not resist the sudden and sometime intense pressure of occasional autoignition. The essence of this invention is the prevention of backflow. It does not do that. Finally, it is also clear to me that even with the backflow, there is no

discernible or significant fouling of the waveguide. 5/

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5. The parties in this case engaged in protracted and expensive pre-trial discovery, assembled 320 exhibits, including numerous video tapes, took numerous depositions, engaged several expert witnesses on each side, and conducted an 8 day jury-waived trial with 3-4 lawyers in attendance daily for each party. Yet, the most convincing evidence was the test, which both parties conducted over 2 years after the suit was filed and at approximately the same time in October to December, 1982. Those tests persuaded me that the Roper oven did not prevent backflow, and that even if it did not prevent backflow, the waveguide was still not fouled. Those two claims - prevention of backflow and, therefore, no waveguide fouling - are the very essence of Roper's patent.

Perhaps more pre-trial discourse between the parties, with independently conducted tests, would have resolved the issues, or at least, narrowed the issues to the point where the expense and effort of all of the participants would have been minimized.

II. CONCLUSIONS OF LAW

The two issues in this case are whether the patent in suit is valid and whether it was infringed. 6/ Before turning to the issues, several preliminary conclusions are appropriate.

The invention date is February 26, 1976, the date on which the application was filed. Accordingly, the prior art must be viewed from the point in time just prior to that date. 35 U.S.C. §103; Monroe Auto Equipment Co. v. Heckethorn Mfg. & Supply Co., 332 F.2d 406, 412 (6th Cir.), cert. denied, 379 U.S. 888 (1964).

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6. Many issues in patent litigation involve mixed questions of fact and law. To the extent the following incorporates factual material, it should be regarded as a continuation of the findings set forth above.

Once granted a patent is presumed valid. The presumption may be rebutted, and the party challenging the patent's validity bears the burden of proving that patent is invalid. 35 U.S.C. §282; Shanklin Corp. v. Springfield Photo Mount Co., 521 F.2d 609 (1st Cir. 1975).

Validity

Raytheon challenges the validity of the patent in suit on three grounds: (1) obviousness, 35 U.S.C. §103; (2) lacking utility, 35 U.S.C. §101; and (3) failing to contain an enabling disclosure and failing to point out and distinctly claim the subject matter of the invention, 35 U.S.C. §112.

Patentability is dependent on three essential elements, namely, novelty, utility and non-obviousness, articulated and defined in 35 U.S.C. §§101, 102 and 103. These elements constitute separate

tests of patentability, each of which must be met in order for a patent to be valid. Graham v. John Deere Co., 383 U.S. 1 (1966); United States v. Adams, 383 U.S. 39, 48 (1966). Accordingly, even though the test of non-obviousness under §103 may be met, the patent still may not issue if the product does not satisfy the additional tests of utility and novelty.

(1) Obviousness

35 U.S.C. §103 provides that an invention is not patentable if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art. The question of obviousness is to be determined

against the background of several basic factual inquiries:

> Under §103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved.

Graham v. John Deere Co., 383 U.S. at 17.

Applying this three-pronged test to the facts of this case, I conclude that the prior art either sealed the end of the waveguide to prevent backflow or it eliminated the self-cleaning mode from the oven. The General Electric and the Litton ovens that were on the market did not have forced air venting through the waveguide during the microwave cooking mode, and as a result those ovens had a moisture problem during microwave cooking. Rather, those ovens sealed the oven cavity end of their waveguides to

prevent the backflow of vapors from the oven cavity.

More specifically, the Boehm patent forced air through the waveguide, but did not self-clean. The Long patent dealt with supplying microwave energy from the bottom, but did not self-clean. The Eff patent and the Maitenaz patent dealt only with limiting air in self-cleaning ovens. The Fitzmayer patent dealt with a common cavity oven, but sealed off the waveguide to prevent fouling. All of these references were a fair summary of the prior art at the time of the Roper application. All of these references were known by those persons of ordinary skill in the art. They were unable to devise a common cavity oven with proper ventilation with the pyrolytic self-cleaning feature. The fact that they were unable to do so is evidence of non-

obviousness. Timely Products Corp. v. Arrow (sic), 523 F.2d 288, 294 (2d Cir. 1975). The fact that Torrey, the inventor, was not able to explain his invention and was surprised by the results does not affect the inventiveness of his product. Reese v. Elhart Welding & Boiler Works, 447 F.2d 517, 525 (7th Cir. 1971). Moreover, unexpected results can evidence non-obviousness. International Telephone & Telegraph Corp. v. Raychem Corp., 538 F.2d 453, 457 (1st Cir. 1976).

The Roper effort differed from the prior art in three respects. It put the waveguide on the bottom. It used part of the cooling air to ventilate the cavity with a blower during microwave cooking. And, when not using forced ventilation, i.e., during the self-cleaning and thermal cooking modes, naturally

convected air was drawn through the system into the cavity in just the right amount to resist backflow.

None of the prior art taught a combination of these features.

The burden of proof is on Raytheon to show obviousness by a standard of clear and convincing evidence. E.I. DuPont de Nemours v. Berkly & Co., Inc., 620 F.2d 1247, 1261 (8th Cir. 1980). Raytheon has not met that burden. The invention is not obvious under 35 U.S.C. §103.

(2) Lack of Utility

Raytheon claims the patent is invalid because it fails to accomplish two stated objectives. Raytheon says the patent is ineffective because it fails to eliminate the possibility of explosion during the self-cleaning mode and it fails to eliminate backflow into the

waveguide. This entire claim is based on various tests run by Raytheon which show that the Roper oven does not prevent backflow and even in those tests which showed backflow, there was still no waveguide fouling.

Roper appears to agree that the prevention of backflow and fouling is the key to the invention and submitted tests to show the patent was effective to accomplish those objectives. Roper also secured waveguides which had been in use for the 6 years and none showed any contamination. There was evidence that there have never been any complaints of explosion or fouling in the over six years that the Roper oven has been on the market.

The question, then, is whether the system described in the patent is effective to accomplish the objectives

claimed by it. On the record before me, I must conclude that it is not. The tests run by Raytheon show that the Roper oven does not prevent backflow, as it claims it does. At the same time, even with the backflow, there is no waveguide fouling. Hurko testified unequivocably that backflow is not a problem even though it exists in the Roper oven. His conclusions are fully supported by his tests which were conducted according to Underwriters Laboratories' standards.

According to Roper, there is no waveguide fouling because there is no backflow. The evidence, which I accept, is that there is backflow, but there is also no waveguide fouling. The conclusion is inescapable, in my judgment. The Roper oven does not substantially accomplish the results claimed for it in the specifications.

The patent claims a result which it cannot obtain. 35 U.S.C. §101 states:

> Whoever invents or discovers any new and useful process machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor....(emphasis supplied)

The term "useful" means that the invention must attain the result claimed by the inventor in his patent. It must work and accomplish its objectives. O'Reilly v. Morse, 56 U.S. 62 (1853); H.C. Baxter Bros. v. Great Atlantic & Pacific Tea Company, 266 F. Supp. 601 (D.ME 1964).

Raytheon has sustained its burden of showing lack of utility by clear and convincing evidence. The patent is not useful and is, therefore, invalid. 35 U.S.C. §101.

(3) The Failure to Describe and Claim the Invention

35 U.S.C. §112 requires that a patent contain a description of how to use the invention to achieve the objects of the invention and the invention must perform the function claimed. General Electric Co. v. Wabash Appliance Corp., 304 U.S. 764 (1978). When an incorrect or questionable theory of operation is included in a patent claim, that claim is invalid. 35 U.S.C. §112; Graver Tank & Manufacturing Co. v. Linde Air Products Co., 336 U.S. 271 (1949).

Raytheon claims that the Roper oven fails to achieve the objects of the invention, namely, elimination of autoignition or backflow. The invention fails, Raytheon says, to describe a device that achieves the uni-directional air flow to eliminate backflow. Raytheon

bases this challenge on its tests that show that there is backflow and autoignition. This is largely a restatement of the challenge to the utility of the Roper oven and need not be re-analyzed here. Accordingly, the patent does not disclose the means of attaining the objects of the invention. O'Reilly v. Morse supra, at 119; Mitchell v. Tilghman, 86 U.S. 287, 392 (1873). Raytheon has sustained its burden of showing the patent is invalid under 35 U.S.C. §112.

Infringement

Having concluded that the patent is invalid for lack of utility and overclaiming, a ruling on infringement is not necessary. See 7 Deller's Walker on Patents, §588 at 425 (an invalid patent cannot be infringed). However, so that

this case can be resolved finally, a ruling on infringement is desirable. United Shoe Machinery Corporation v. Industrial Shoe Machinery Corporation, 335 F.2d 577, 578 (1st Cir. 1964), cert. denied, 329 U.S. 990, reh. denied, 380 U.S. 927 (1965).

Infringement must be proved by a preponderance of the evidence. General Electric Co. v. United States, 572 F.2d 745 (Ct. Cl. 1978). To prove infringement, Roper must show that every element set forth in at least one claim be present in Raytheon's oven and that the Raytheon oven must do substantially the same work in substantially the same device. Westinghouse Air Brake Co. v. Boyden Power Brake Co., 170 U.S. 537, 538 (1898); Graver Tank & Manufacturing Co. v. Linde Air Products Co., 339 U.S. 605 (1950).

Raytheon claims its ovens do not infringe because its oven fails to accomplish the same result in the same way as the claimed device. Specifically, Raytheon's door contains a gap through which air flow is designed to enter. Roper argues that the gap in Raytheon's door is so small as to be of insignificant effect on the entry of air. Roper also claims that no commercial oven door completely seals against the passage of air.

Raytheon also says its oven does not infringe for two additional reasons. Its oven does not prevent backflow with the waveguide during autoignition and that its oven has more than one constriction of the airflow passageway comprising the airflow system.

This issue boils down to the presence of the "usual gap" in Raytheon's

door and the presence of some backflow. If the patent were valid, it would be so because there was sufficient naturally convected air flow through the waveguide to prevent significant backflow.

First, the evidence is clear that the "usual gap" in the Raytheon door does not materially affect the entry of air. Most of the air admitted and which is naturally convected through the cavity comes through the waveguide. The "usual gap," therefore, is not a sufficient alteration. St. Regis Paper Company v. Winchester Carton Corporation, 410 F.Supp. 1304, 1308-09 (D. Mass. 1975) (infringement charge cannot be avoided where a competitior, by substitution or addition, accepts a somewhat less desirable result while acting within the concept of the invention).

A finding of infringement requires that there be an identity of structure, of mode of operation and of results accomplished between the claimed invention and the accused product. Graver Tank & Manufacturing Co. v. Linde Air Products Co., supra, 339 U.S. at 608-609. A change in form or a change in the position of one component is not sufficient to avoid infringement. The functioning of the air flow system taught in the Torrey claims is embraced by the Raytheon oven, and even though it may vary somewhat, it does not avoid infringement. The substance of Torrey's claim is adopted by the Raytheon oven and infringement can still be had under the doctrine of equivalents. Graver Tank & Manufacturing Co. v. Linde Air Products Co., supra, 339 U.S. at 609. See

generally 7 Deller's Walker on Patents §546.

In sum, my review of this record persuades me that if the Roper patent were valid, Raytheon's oven would infringe. It is operationally similar. It is structurally similar. The evidence shows that the Raytheon oven development began with a toatally different structure and eventually ended up with an oven which in every essential respect, is a copy of the Roper oven, as shown in the diagram on page 29.

Attorney's Fees

35 U.S.C. §285 provides that attorneys' fees may be awarded to the prevailing party in "exceptional cases." I do not find this to be an exceptional case. I do not find that Roper has acted in bad faith or that attorneys' fees are

appropriate or necessary to prevent injustice. See generally 8 Deller's Walker on Patents, §760. 7/

Conclusion

The patent in suit is invalid because of lack of utility and failure to particularly claim the invention. 35 U.S.C. §§103, 112. The plaintiff is entitled to a declaratory judgment that United States Patent No. 4,028,520 is invalid and unforceable.

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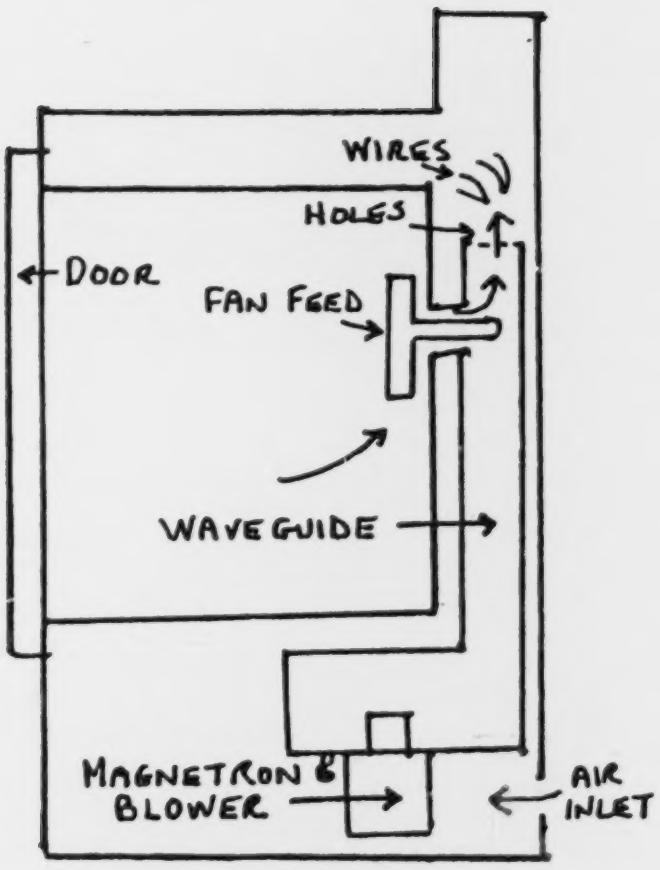
7. I am aware of my earlier note that more of a pre-trial effort by the parties in testing this oven may have persuaded them that a trial and the accompanying expense were not warranted. However, I cannot attribute the responsibility for that to either side.

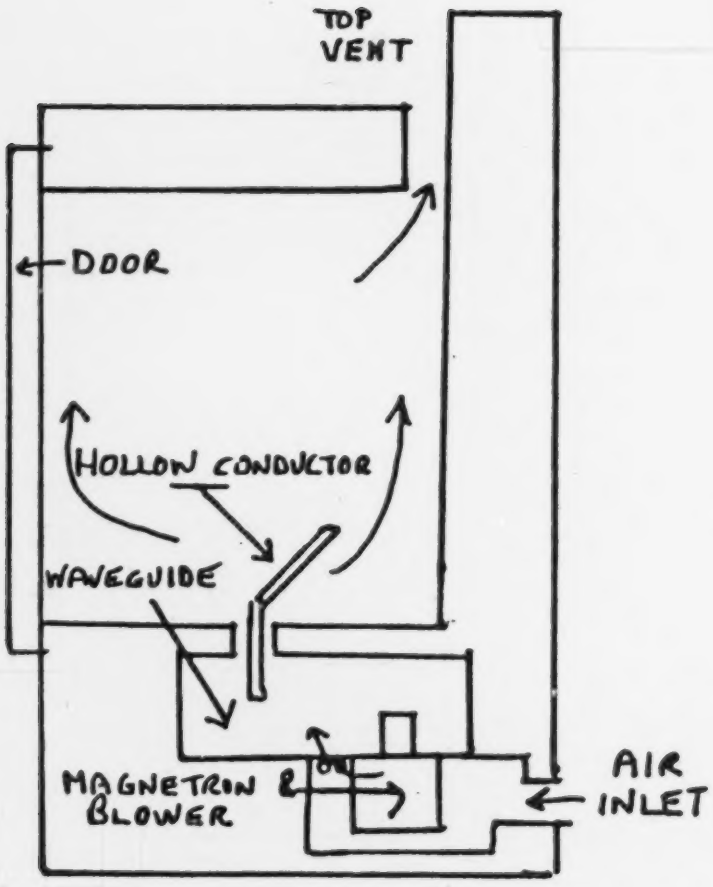
SO ORDERED.

/s/ A. David Mazzone

United States District Judge



RAYTHEON'S
1975 PROTOTYPE


TOP
VENT
DOOR
HOLLOW CONDUCTOR
WAVEGUIDE
MAGNETRON &
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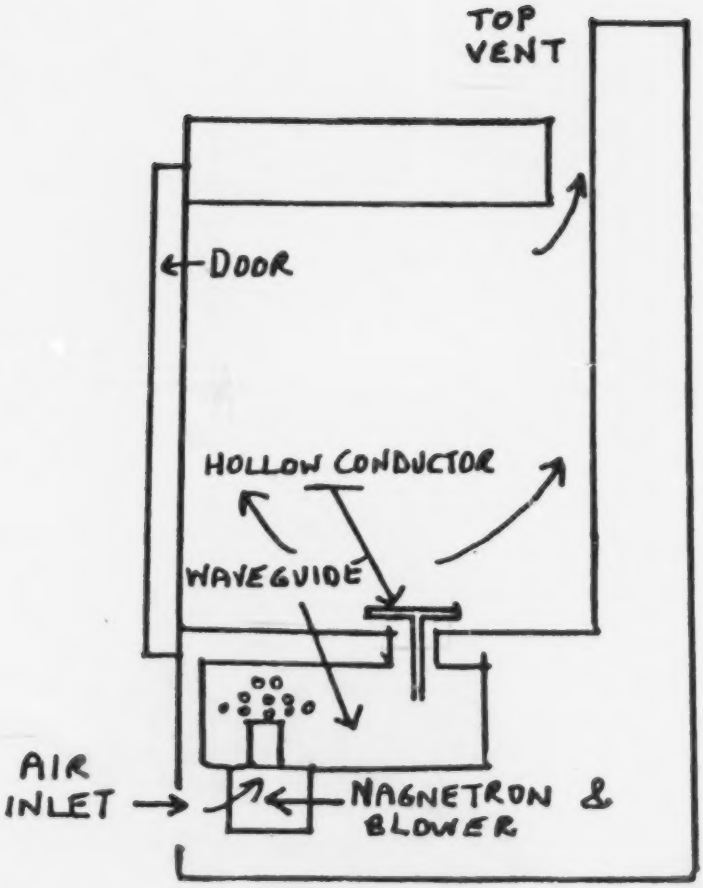
AIR
INLET

ROPER'S OVEN



RAYTHEON'S OVEN

Copy of '520 patent appended to district court opinion, is omitted; see App. A1.

United States Court of Appeals
for the Federal Circuit

RAYTHEON COMPANY,	)	Appeal
	)	Nos.
	)	83-851
Appellee/Cross Appellant,	)	83-853
	)	
v.	)	
	)	
ROPER CORPORATION,	)	
	)	
Appellant/Cross Appellee.	)	

DECIDED: December 30, 1983

Before MARKEY, Chief Judge, DAVIS, Circuit Judge, and KELLAM, Senior District Judge. */

MARKEY, Chief Judge.

Roper Corporation (Roper) appeals from a judgment of the United States District Court for the District of

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*/ The Honorable Richard B. Kellam, Senior District Judge, Eastern District of Virgina, sitting by designation.

Massachusetts declaring U.S. Patent No. 4,028,520 ('520 patent), issued to Sumner H. Torrey and assigned to Roper, invalid for lack of utility and because its disclosure is non-enabling. Raytheon Company (Raytheon) cross-appeals a holding of nonobviousness, a finding of infringement, and a refusal to award attorney fees. We reverse in part, affirm in part, and remand.

BACKGROUND

A. Prior Technology

The Roper patent is directed to a "common cavity" oven capable of conventional thermal cooking, microwave cooking, and pyrolytic self-cleaning (i.e., heating the walls to about 900°F. to break down soil baked thereon). Those three "modes" of operation (thermal

cooking, mircrowave cooking, and self-cleaning) are not totally compatible.

At the time of the Torrey invention, cooking in a thermal oven required minimal amounts of air. Ventilation of thermal oven cavities was accomplished through an opening in the oven door, air flowing by natural convection from the opening upwardly through the cavity and escaping via a vent at the top of the cavity.

Microwave cooking involved radiation supplied by a microwave feed unit. The feed unit included a magnetron generating radiation and an antenna transmitting the radiation to the oven cavity. The radiation travelled from the magnetron to the antenna through a hollow metal tube called a waveguide. The magnetron had projecting fins to help

dissipate heat. A fan or blower moved cooling air through the magnetron fins and power supply.

Microwave cooking produced more moisture than thermal cooking. To remove mositure vapors from the cavity of a conventional microwave oven, a blower or fan was employed to blow them out a vent at the cavity top. Microwave cooking also required maximum sealing of the cavity to prevent escape of microwave energy. Thus, the opening in the oven door of a thermal oven was not desirable in a microwave oven.

Inclusion of a self-cleaning mode further complicated the ventilation of an oven operable in the thermal and microwave modes. Though a limited air supply was needed to flush smoke and volatile products of self-cleaning, excess air caused combustion of those

products. That combustion, known as "autoignition", produced sudden pressure that sought release through any opening, including "backflow" through the waveguide. Although autoignition occurred only occasionally, backflow was thought to contaminate ("foul") the waveguide with burnt food particles cleaned from the cavity walls. Moreover, if autoignition were fueled by even greater amounts of excess air, as when forced air removed moisture produced in the microwave mode, fire or explosion could result.

Self-cleaning common cavity ovens were first marketed in the mid-1960's, but by 1973, the General Electric and Litton ovens on the market still had ventilation problems. To meet those problems, the ends of the waveguides in those ovens were sealed to

prevent fouling of the microwave feed unit by autoignition and backflow. As a result, moisture and steam developed in the microwave mode could not be removed by forcing air to the cavity through the waveguide. General Electric and Litton regarded this problem as serious enough to require customer warnings in their product manuals.

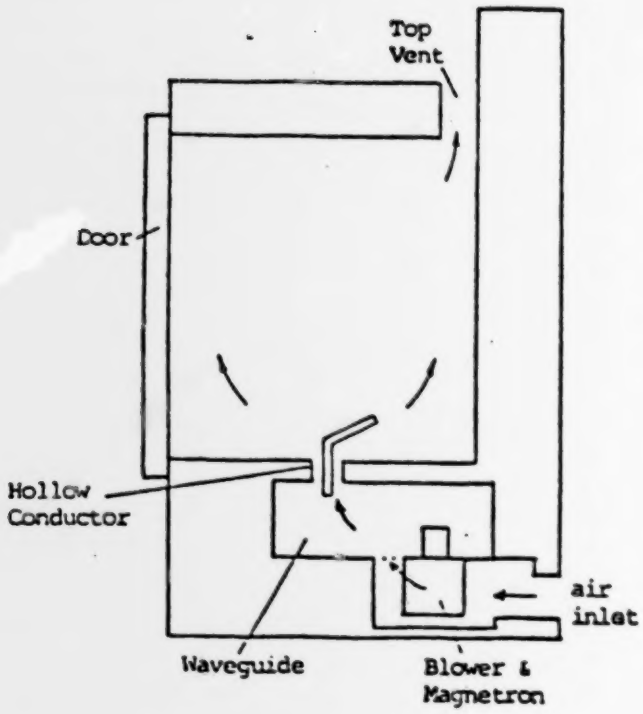
B. The Torrey Invention

In 1973, Roper began work on a self-cleaning common cavity oven. Under Torrey's supervision, Roper developed an oven with proper ventilation during the microwave, thermal, and self-cleaning modes, and which, to Torrey's surprise, had no fouling problems.

In the summer of 1976, Roper marketed its oven nationally under its own name and through Sears, Roebuck &

Company under the Kenmore label. About 24,000 have been sold, with no complaints respecting contamination of the microwave feed system. The Roper oven was and is a successful product.

Torrey's February 26, 1976 application for patent issued without amendment as the '520 patent on June 7, 1977. The patented invention is depicted by this simplified drawing, shown alongside a simplified drawing of the accused Raytheon oven:


Top
Vent
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Conductor
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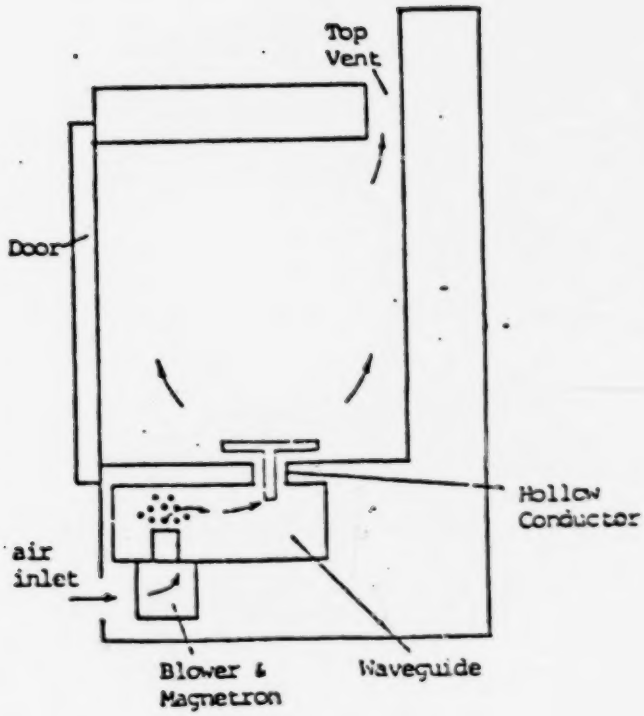
inlet
Waveguide
Blower &
Magnetron

ROPER'S OVEN



RAYTHEON'S OVEN

In the Torrey invention, the microwave entry is located at the bottom of the oven cavity. Air to remove microwave cooking moisture is forced into the cavity through the microwave system. A pattern of small passages is provided in the wall of the waveguide so that a portion of the air from the blower, which cools the magnetron, flows through the waveguide and hollow conductor. When the blower is on, the air path is from the waveguide, through the cavity and venting through the top. When the blower is off, during thermal cooking and self-cleaning, convected air ventilates the cavity via the same path. The small passages are sufficiently screened to avoid leakage of radiation. The patent specification discloses a forced air flow of three to eight cubic feet per minute (cfm) and a convection flow of 0.5 to 2.0 cfm.

There are five independent and two dependent claims in the '520 patent. Claim 5, on which claims 6 and 7 depend, is representative:

> 5. In a combined microwave-thermal range, the combination comprising a frame having walls defining a rectangular oven cavity and a lower space of conforming shape, a door enclosing and sealing the front surface of the cavity against passage of air and microwave energy, a thermal element in the cavity, control means for operation of the thermal element within a normal temperature range for food preparation and at a high temperature level for a self-cleaning mode, the walls of the cavity being insulated, the bottom wall of the cavity having an inlet opening, means defining a cavity air vent at the top of the cavity, a microwave power supply having a housing including a magnetron and blower, the blower having a blower inlet and arranged to draw in cooling air for discharge under slight pressure to the magnetron, a waveguide having an inlet connected to the magnetron and exending under the bottom wall of the cavity to terminate at an outlet, means for connecting

the outlet of the waveguide to the inlet opening of the cavity for conduction of microwave energy into the cavity, the waveguide being open to passage of cooling air from the magnetron so at least a portion of the pressurized air from the blower and magnetron passes through the waveguide and into the cavity for ventilating the cavity when the magnetron and blower are turned on, the blower inlet being located at a level below the bottom wall of the cavity so that when the blower and magnetron are turned off and the thermal element is turned on air is thermally convected through the blower inlet, magnetron, and waveguide into the cavity for final exit through the cavity air vent at the top therof, the air passage through the blower, mangetron and waveguide being sufficiently constricted so that the air is convected in the self-cleaning mode at a level below that which is capable of producing an explosive reaction with the products of thermal decomposition.

All claims are reproduced in the Appendix.

C. District Court Proceedings

On September 9, 1980, Raytheon sued for a declaratory judgment that the '520 patent was invalid. Roper counterclaimed for infringement of all claims. After trial without a jury, the district court issued an opinion on January 20, 1983, and a judgment on January 28, 1983.

The district court declared the patent invalid because of a lack of

utility required by 35 U.S.C. § 101 [1] and the absence of enabling disclosure required by 35 U.S.C. § 112. [2] The district court also found that the Torrey invention was a commercial success, held

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1/ 35 U.S.C. § 101 states:

> Whoever, invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

2/ 35 U.S.C. § 112, paragraph one, states:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

that the invention would have been nonobvious, [3/] and found that if the claims were valid, Raytheon would be liable for having infringed them. [4/]

3/ 35 U.S.C. § 103 states:

> A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

4/ 35 U.S.C. § 271(a) states:

> Except as otherwise provided in this title, whoever without authority makes, uses or sells any patented invention, within the United States during the term of the patent therefor, infringes the patent.

Because the case was not in its view an "exceptional" one, as required by 35 U.S.C. § 285, [5/] the district court refused to award attorney fees to Raytheon.

ISSUES

Did the disrict court err in (1) its judgment of invalidity under 35 U.S.C. §§ 101 and 112; (2) its holding of nonobviousness under 35 U.S.C. § 103; (3) its finding of infringement; (4) its failure to award attorney fees.

5/ 35 U.S.C. § 285 states:

> The court in exceptional cases may award reasonable attorney fees to the prevailing party.

OPINION

A. Standard of Review

Raytheon argues the evidence de novo. As Roper correctly points out, this court does not review the fact record de novo. District court findings must be accepted unless they are predicated on an improper legal foundation, see, e.g., W. L. Gore & Associates, Inc. v. Garlock, Inc., No. 83-613, Sl. Op. at 8-9 (Fed. Cir. 1983), or unless they are shown by the party challenging them to be "clearly erroneous", i.e., unless this court is left with the "definite and firm conviction that a mistake has been committed". Inwood Laboratories, Inc. v. Ives Laboratories, Inc., 456 U.S. 844, 2189 (1982). The clearly erroneous

standard applies to findings, not to legal conclusions.

B. Invalidity for lack of utility

Utility is a fact question, see, e.g., Wilden Pump v. Pressed & Welded Products Co., 655 F.2d 984, 988, 213 USPQ 282, 285 (9th Cir. 1981); Nickola v. Peterson, 580 F.2d 898, 911, 198 USPQ 385, 399 (6th Cir. 1978), cert. denied, 440 U.S. 961 (1979). In determining utility, however, the claims must first be interpreted to define the invention to be tested for utility. Claim interpretation is a legal matter subject to review free of the clearly erroneous standard applicable to fact findings. Fromson v. Advance Offset Plate, Inc., No. 83-850, Sl. Op. at 8-9 (Fed. Cir. 1983).

In this case, the district court's holding that claim 1 is invalid must be affirmed, but its holding of invalidity for lack of utility in the inventions set forth in claims 2-7 must be reversed because the latter rests on an erroneous interpretation of those claims, as well as on other incorrect legal bases.

1. The district court correctly interpreted and held invalid claim 1 but erroneously interpreted claims 3 and 4 as requiring prevention of backflow during autoignition.

In Linde Air Products Co. v. Graver Tank & Mfg. Co., 86 F.Supp. 191, 197, 75 USPQ 231, 235 (N.D. Ind. 1947), rev'd, 167 F.2d 531, 536-37, 77 USPQ 207, 212 (7th Cir. 1948), aff'd, Graver Mfg. Co. v. Linde Co., 336 U.S. 271, 277-79 (1949), certain process claims were held

invalid because they included incorrect ideas and:

> To make a claim for a . . . process in which these erroneous ideas are incorporated is to stake out a process . . . which does not in point of fact exist within the invention. While a patent covering a meritorious invention should not be struck down because the patentee has misconceived the scientific principle of his invention, the error cannot be overlooked when the misconception is embodied in the claim.

Accord, Noma Lites Canada Ltd. v. Westinghouse Electric Corp., 399 F.Supp. 243, 253, 186 USPQ 485, 493 (D.D.C. 1975) ("When an incorrect or questionable theory of operation is included in a patent claim, that claim is invalid. 35 U.S.C. § 112."). Because it is for the invention as claimed that enablement must exist, and because the impossible cannot be enabled, a claim containing a limitation impossible to meet may be held

invalid under § 112. Moreover, when a claim requires a means for accomplishing an unattainable result, the claimed invention must be considered inoperative as claimed and the claim must be held invalid under either § 101 or § 112 of 35 U.S.C. See, e.g., General Electric Co. v. United States, 572 F.2d 745, 755, 198 USPQ 65, 93 (Ct.Cl. 1978); In re Harwood, 390 F.2d 985, 989, 156 USPQ 673, 676 (CCPA 1968); CPC International, Inc. v. Standard Brands, Inc., 385 F.Supp. 1057, 1061, 184 USPQ 332, 335 (D. Del. 1974); Novelart Mfg. Co. v. Carlin Container Corp., 363 F.Supp. 58, 76, 179 USPQ 17, 29 (D.N.J. 1973). Whether the appropriate basis for holding claim 1 invalid be failure of compliance with the utility requirement of § 101 or with the enablement requirement of § 112, therefore, that holding must be affirmed.

In the present case, the district court interpreted claims 1, 3 and 4 as requiring that the inventions set forth in those claims include a means for continuing convection during autoignition. The district court found, however, that convection did not in fact occur during occasional autoignition in the Roper oven, a finding which is not clearly erroneous. Given that claim interpretation and finding, the district court was compelled under the above authorities to hold those claims invalid. However, though the district court was correct in interpreting and holding invalid claim 1, it legally erred in interpreting claims 3 and 4.

Claim 1 specifically provides: "the blower inlet being located at a level below the bottom wall of the cavity so that when the blower and magnetron are

turned off and the thermal element is turned on air is thermally convected from the blower inlet through the air passages into the waveguide and into the cavity for exiting through the cavity air vent notwithstanding the autoignition pressure which exists in the cavity under high temperature self-cleaning conditions" (emphasis added). Though, as discussed infra, the phrase is based on Torrey's erroneous theory respecting the absence of waveguide fouling, and though the functional language is introduced by "so that", we must read the phrase as the equivalent of one specifying as an element in the claim "means for continuing convection during autoignition". Because the required continuation of convection (described by the parties as "prevention of backflow") during periods of autoignition does not

and physically cannot happen, claim 1 must be held invalid. Graver Mfg. Co., supra.

The district court impermissibly read the above-quoted language from claim 1 into claims 3 and 4. The impropriety of reading limitations into claims is dramatized where, as here, the limitation sought to be added is already present in another claim. Environmental Designs, Ltd. v. Union Oil Co. of California, 713 F.2d 693, 699, 218 USPQ 865, 870-71 (Fed. Cir. 1983). Accord, Fromson v. Advance Offset Plate, Inc., supra, sl. op. at 11; Caterpillar Tractor Co. v. Berco, S.P.A., 714 F.2d 1110, 1116, 219 USPQ 185, 188 (Fed. Cir. 1983); Kalman v. Kimberly Clark Corp., 713 F.2d 760, 770, 218 USPQ 781, 788 (Fed. Cir. 1983).

In arguing that claims must be read in light of the specification, that prevention of backflow is the "essence" of Torrey's invention, and that all claims must therefore be read as including the quoted limitation of claim 1, Raytheon confuses the respective roles of the specification and claims. That claims are interpreted in light of the specification does not mean that everything expressed in the specification must be read into all the claims. On the contrary, as was said in Environmental Designs, supra, 713 F.2d at 699, 218 USPQ at 871:

> [t]he specification must be sufficiently explicit and complete to enable one skilled in the art to practice the invention, while a claim defines only that which the patentee regards as his invention. 35 U.S.C. § 112. The claim, not the specification, measures the invention. (Case cited). [T]he argument that claim 1

> must include a limitation found in the specification is thus legally unsound. Smith v. Snow, 294 U.S. 1 (1935).

Raytheon says Roper is precluded by an "appeal estoppel" from contesting the inclusion of "no backflow during autoignition" in all claims because Roper relied on "no backflow" in the district court and should not be allowed to change its theory on appeal. Examination of the trial record, however, reveals that Roper there stressed the theory it urges on appeal, and that it was Raytheon which argued that the "essence" of Roper's invention was no backflow during autoignition.

In its opening statement at trial, Roper stressed "no fouling" and various other objectives without once mentioning "no backflow" (let alone "no backflow during autoignition"). In Roper's forty-page Proposed Findings of

Fact and Conclusions of Law, Roper mentioned only once (proposed finding 79) that there is no backflow during autoignition. In its pretrial brief, Roper stated that it:

> discovered that by positioning the microwave feed system below the oven cavity, and providing an air path from an air inlet below the cavity through the microwave feed system (including the waveguide) and up into the cavity, natural convection would draw air through that path to the oven cavity and up through it to result in sufficient venting of the oven during both thermal cooking and self-cleaning. For reasons not really understood, the waveguide through which convected air flowed would not be fouled by normal autoignition pressures that occur during self-cleaning, even though the waveguide entry location at the bottom of the oven cavity would seem to be a place subject to particularly high contamination. (Emphasis added)

That is not the approach of one hinging its entire case and all the claims on "no

backflow during autoignition". The unchallenged evidence established that Roper's ovens experienced no fouling or contamination. There is no basis in the record, therefore, for the imposition of an "appeal estoppel" precluding Roper from reliance on the claims as written and allowed.

2. The district court erroneously interpreted claims 1, 2 and 5-7 as requiring the prevention of autoignition.

The district court, at Raytheon's urging, interpreted claims 1, 2 and 5-7 as requiring the prevention of autoignition. Because autoignition clearly occurs, that interpretation apparently led to the holding that those claims were invalid for lack of utility. That interpretation, however, was legally

erroneous, and Raytheon has virtually abandoned it in its briefs on appeal.

The district court apparently and incorrectly equated prevention of "autoignition" with prevention of "explosive reactions", the latter being required by claims 1, 2 and 5-7. As the district court found, autoignition occurs when the decomposition products of pryolytic self-cleaning react with some excess air to produce combustion. It is only when greater amounts of air enter the cavity that autoignition might escalate into an "explosion". Torrey did not claim to prevent autoignition; he claimed only to prevent explosions by restricting the air path to limit the excess of air to a level below that productive of explosions. As stated by Roper in its Proposed Findings of Fact and Conclusions of Law, "it is well known

in the art that one cannot completely eliminate the possibility of autoignition", and "too much air in the oven during self-cleaning causes the autoignition to become severe and even explosive". The patent itself addresses autoignition as something to be "resisted", not eliminated. Moreover, the difference in the two concepts is illustrated by claim 1's express acceptance of "autoignition pressure" and prevention of an "explosive reaction".

Thus, although claim 1 was correctly held invalid as set forth in section 1 above, there is no basis in the record on which to hold claims 2-7 invalid for lack of utility.

3. A claimed invention need not accomplish all objectives stated in the specification.

The district court held the '520 patent invalid in part because Roper's oven, as set forth in claims interpreted by the district court as requiring prevention of backflow and autoignition, failed to accomplish all objectives stated in the patent. Raytheon urged at oral argument that that holding is compelled by Mitchell v. Tilghman, 86 U.S. 287, 396-97 (1873) (a patent is void "if the described result cannot be obtained by the described means"). In Mitchell, the described result was production of fatty acids and glycerin from fatty or oily substances by the action of water at high temperature and pressure. Id. at 296, 380. That was the single result stated and was an element of the claim. Id. at 296. To

interpret Mitchell as requiring that all claims must set forth inventions satisfying all objectives would make no sense. When a properly claimed invention meets at least one stated objective, utility under § 101 is clearly shown. See, e.g., Standard Oil Co. (Indiana) v. Montedison, S.P.A., 664 F.2d 356, 375, 212 USPQ 327, 344 (3rd Cir. 1981), cert. denied, 456 U.S. 915 (1982); E.I. du Pont de Nemours & Co. v. Berkley & Co., 620 F.2d 1247, 1258 n.10, 1260 n.17, 205 USPQ 1, 8 n.10, 10 n.17 (8th Cir. 1980); Krantz and Croix v. Olin, 148 USPQ 659, 661-62 (CCPA 1966); Chisum on Patents, § 4.04[4] [1983].

Here, the Torrey invention as set forth in claims 2-7 clearly accomplished at least one, and a major one, of the patent's stated objectives, i.e., a "ventilating system for a common

cavity oven usable in all three modes of operation and which is safe in all three modes and which runs no risk of violent explosion of the products of combustion in the self-clean mode". The incorrectness of Torrey's theory explaining the absence of fouling (i.e., that continued convection prevented backflow during autoignition) does not undermine the unchallenged accomplishment of the quoted objective by the ovens set forth in claims 2-7. Torrey was attempting to explain in his specification why his tests showed no fouling, and a patentee is not responsible for the correctness of such theories and explanations when their correctness is not related to validity of the claims under consideration. See e.g., Fromson v. Advance Plate, Inc., supra, Sl. Op. at 11. (In Fromson, the

sole issue was infringement, and validity of non-asserted claims including a limitation based on the patentee's theory that an alumino-silicate layer was produced, was not before the court.)

4. Lack of utility cannot co-exist with infringement and commercial success.

The wisdom of the trial court in deciding validity and infringement, and the interrelationship of those issues, are manifested in the present case. See, Medtronic, Inc. v. Cardiac Pacemakers, No. 83-820, Sl. Op. at 43 (Fed. Cir. 1983); Gore v. Garlock, supra, al. (sic) op. at 40.

The district court's finding on infringement of claim 1 was clearly erroneous because Raytheon's proof established the impossibility of its oven having a means to continue convection

during autoignition. However, the court's finding on infringement of claims 2-7 was not clearly erroneous. See secion E, infra. That finding compels the conclusion that claims 2-7 cannot be held invalid for lack of utility.

A correct finding of infringement of otherwise valid claims mandates as a matter of law a finding of utility under § 101. See e.g., E.I. duPont de Nemours & Co. v. Berkley & Co., supra, 620 F.2d at 1258-61, 205 USPQ at 8-11; Tapco Products Co. v. Van Mark Products Corp., 446 F.2d 420, 428, 170 USPQ 550, 555-56 (6th Cir.), cert denied, 404 U.S. 986 (1971). The rule is not related, as Raytheon argues, to whether a defendant may simultaneously assert non-utility and non-infringement; a defendant may do so. The rule relates to the time of decision not to the time of trial, and

is but a common sense approach to the law. If a party has made, sold, or used a properly claimed device, and has thus infringed, proof of that device's utility is thereby established. People rarely, if ever, appropriate useless inventions.

Proof of such utility is further supported when, as here, the inventions set forth in claims 2-7 have on their merits been met with commercial success. See e.g., Medtronic, Inc., supra, sl. op. at 43; Wilden Pump v. Pressed & Welded Products Co., supra, 655 F.2d at 988, 213 USPQ at 285; CTS Corp. v. Piher International Corp., 527 F.2d 95, 105, 188 USPQ 419, 428 (7th Cir. 1975), cert. denied, 424 U.S. 974 (1976).

In sum, we hold in this section B that claims 2-7 are not invalid for lack of utility.

C. Invalidity Under 35 U.S.C. § 112

After stating that Raytheon's challenge under § 112 was largely a restatement of its challenge under § 101, the district court held that Raytheon had sustained its burden of proving invalidity under the former. We agree that the two defenses rest on the same foundation in this case. Having reversed the holding of invalidity of claims 2-7 under § 101, we accordingly reverse the holding with respect to those claims under § 112. We conclude as a matter of law that the specification of the '520 patent contains a clear description enabling one skilled in the art to make

and use the inventions set forth in claims 2-7. 6/

D. 35 U.S.C. § 103

The district court properly approached and decided the nonobviousness/obviousness issue in light of 35 U.S.C. § 103. First, it recognized the statutory presumption of validity and

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6/ Enablement under 35 U.S.C. § 112, paragraph 1, is a question of law. In re Hogan, 559 F.2d 595, 604,194 USPQ 527, 535 (CCPA 1977); In re Brandstandter, 484 F.2d 1395, 1405, 179 USPQ 286, 293 (CCPA 1973); In re Naquin, 398 F.2d 863, 866, 158 USPQ 317, 319 (CCPA 1968); In re Chilowsky, 306 F.2d 908, 909, 134 USPQ 515, 516 (CCPA 1962). Accord, Plastic Containers Corp. v. Continental Plastics of Oklahoma, Inc., 607 F.2d 885, 891-92 n.9, 203 USPQ 27, 32 n.9 (10th Cir. 1979), cert. denied, 444 U.S. 1018 (1980); Hirschfield v. Banner, 462 F.Supp. 135, 142, 200 USPQ 276, 281 (D.D.C. 1978), aff'd, 615 F.2d 1368 (D.C. Cir. 1980), cert. denied, 450 U.S. 994 (1981).

that the burden was on Raytheon to overcome it by proving facts with clear and convincing evidence. See e.g., Connell v. Sears, Roebuck & Co., No. 83-841, Sl. Op. at 13 (Fed. Cir. 1983). 7/ Second, the court neither ignored nor modified the presumption merely because Raytheon cited prior art not before the Patent Office. Citation of such art -- even when more pertinent than the art before the Examiner (which the district court correctly found was not the case here) -- does not destroy the presumption, although it may make it easier for the one attacking validity to

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7/ That presumption, stated in 35 U.S.C. § 282, also applies to utility. See e.g., Medtronics, Inc. v. Cardiac Pacemakers, Inc., supra, Sl. Op. at 6.

overcome the burden set by 35 U.S.C. § 282. See Connell, supra, Sl. Op. at 13.

Third, the district court correctly assessed the evidence in light of the factual inquiries enunciated in Graham v. John Deere Co., 383 U.S. 1 (1966).

Presumably, the district court's conclusion of nonobviousness (and finding of infringment, discussed infra) applied to all claims, although the opinion did not so state (the "patent" was declared invalid; the "claims" were found infringed). For purposes of this appeal, "the claimed invention" in what follows concerning nonobviousness and infringement may be read as in light of representative claim 5. Because the claims were not argued separately on appeal, and because differences in the claims cannot here affect the result, all

claims (except claim 1) can be seen to stand or fall with claim 5. See e.g. In re Kaslow, 707 F. 2d 1366, 1376, 217 USPQ 1089, 1096 (Fed. Cir. 1983).

1. The Prior Art

The relevant prior art encompassed microwave ovens, combination microwave-thermal ovens, and self-cleaning thermal ovens. A summary of relevant prior art teachings is contained in the "Background" section, supra. Additionally, although the prior art taught placement of a microwave feed unit below a microwave oven, it taught away from placing an open feed unit below a self-cleaning common cavity oven because the art believed the unit would be contaminated.

2. Differences Between the Prior Art and the Claimed Invention.

The claimed invention is a self-cleaning common cavity oven having, inter alia, (1) an open waveguide located at the bottom, (2) through which forced, cooling air from the blower passes during the microwave mode only, and (3) ventilation occurs via convection through the waveguide openings during the thermal and self-cleaning modes. No self-cleaning common cavity oven existing at the time of the Torrey invention embodied any of those three elements.

3. Level of Ordinary Skill in the Art

Raytheon and Roper employed people skilled in the art of designing ovens for cooking food in both microwave and thermal modes, among them graduate

engineers with substantial background and experience in the design, development, and marketing of ovens.

4. Objective Evidence of Nonobviousness

Evidence of long felt need, unexpected results and commercial success is outlined in the "Background" section, supra.

5. Conclusion on Non-obviousness

The district court concluded that Raytheon did not overcome the presumption of nonobviousness, and we agree. Raytheon has not shown these findings to have been clearly erroneous: the findings under 1-3 above; the finding that persons of ordinary skill were unable to devise a common cavity oven

with proper ventilation and a pyrolytic self-cleaning feature; or the finding that Torrey unexpectedly found that his invention worked. Those fact findings, together with those on commercial success and the prior art's teaching away from location of the open waveguide at the bottom of a self-cleaning common cavity oven, are highly probative, objective criteria fully capable of serving as a foundation for the legal conclusion of nonobviousness.

Raytheon suggests that Roper merely combined well known elements to form its oven. In the district court, Raytheon was more explicit, citing a single sentence from the opinion in Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp., 340 U.S. 147 (1950) ("courts should scrutinize combination patent claims with a care proportioned to

the difficulty and improbability of finding invention in an assembly of old elements"). This court has been unable to construe the cited sentence, however, "as a rule of law applicable broadly to patent cases because virtually every claimed invention is a combination of old elements", Medtronic, Inc. v. Cardiac Pacemakers, Inc., supra, slip op. at 4, and because the Supreme Court has held combinations of old elements patentable. See, e.g., United States v. Adams, 383 U.S. 39, 51-52 (1966). It is moreover simplistically unrealistic to employ a separate test of patentability for combinations of old elements when the language of the 1952 Patent Act provides no basis for either classifying patents into different "types" or for applying different treatment to different "types" of patents. Accord, Richdel, Inc. v.

Sunspool Corp., 714 F.2d 1573, 1579-80, 219 USPQ 8, 12 (Fed. Cir. 1983); Environmental Designs, Ltd. v. Union Oil Co. of Cal., supra, 713 F.2d at 698, 218 USPQ at 870.

E. Infringement

Whether an accused device infringes properly interpreted claims is a fact question. See e.g., Fromson v. Advance Offset Plate, Inc., supra, Sl. Op. at 8-9. Here, the district court apparently found infringement under the doctrine of equivalents. The test for equivalency is whether the accused device "performs substantially the same function in substantially the same way to obtain the same result" as the claimed invention. Hughes Aircraft v. United States, 717 F.2d 1351, 1361, 219 USPQ 473, 480 (Fed. Cir. 1983). The finding

on equivalency is subject to the clearly erroneous standard on review. Thomas & Betts Corp. v. Litton Systems, Inc., No. 83-537, Sl. Op. at 12-13 (Fed. Cir. 1983). Here, the district court's ultimate finding of equivalence (except in respect of claim 1) has not been shown to have been clearly erroneous.

Raytheon asserts three differences between its oven and the claimed invention. First, the former has a gap in its door, and the claim includes "a door enclosing and sealing the front surface of the cavity against passage of air and microwave energy". Raytheon's gap precludes a finding of literal infringement but not a finding of infringement under the doctrine of equivalents. The district court found that Raytheon's gap does not materially affect entry of air, most of which comes

through the waveguide, only the most minor amounts being admitted through the gap. The district court said, "[t]he functioning of the air flow system taught in the Torrey claims is embraced by the Raytheon oven". That finding has not been shown to have been clearly erroneous.

Second, Raytheon says its oven does not prevent backflow and autoignition, and all claims should be interpreted as requiring prevention of both. As above indicated, however, only claim 1 contains a "no backflow" limitation, and no claim contains a "no autoignition" limitation. Hence, only the court's finding that claim 1 is infringed is clearly erroneous.

Third, Raytheon argues that convection air does not enter its waveguide through its blower inlet, as

required by claims 2 and 4-7, nor through the blower inlet and housing vent as called for in claim 3, but through a hole in the duct attached to its waveguide. Raytheon's convection air from its attached duct, however, "performs substantially the same function in substantially the same way to obtain the same result" as convection air from the blower inlet, and the district court's finding of equivalence in convection air inlet locations has not been shown to have been clearly erroneous.

Attorney Fees

Under 35 U.S.C. § 285, a district court may award such fees to the prevailing party in "exceptional" cases. The decision to award or deny fees is discretionary with the district court. See e.g., Orthopedic Equipment Co. v. All

Orthopedic Appliances, 707 F.2d 1376, 1384, 217 USPQ 1281, 1287 (Fed. Cir. 1983). No basis has been shown for a determination that the district court abused its discretion in denying attorney fees to Raytheon.

CONCLUSION

The district court did not err in holding claim 1 invalid, in holding that the inventions set forth in claims 2-7 would have been nonobvious, in finding claims 2-7 infringed, or in denying Raytheon's request for attorney fees. The district court did err in holding claims 2-7 invalid under 35 U.S.C. § 101 for lack of utility and under 35 U.S.C. § 112 for lack of an enabling disclosure.

Accordingly, we affirm the judgment that claim 1 is invalid, affirm

the judgment that claims 2-7 are not invalid under 35 U.S.C. § 103, affirm the judgment that claims 2-7 are infringed by the accused Raytheon ovens, affirm the denial of attorneys fees to Raytheon, reverse the district court's judgment that claims 2-7 are invalid, and remand for further proceedings consistent herewith.

AFFIRMED IN PART; REVERSED IN PART; REMANDED

APPENDIX -- CLAIMS OF ROPER PATENT

1. In a combined microwave-thermal range, the combination comprising a frame having walls defining a rectangular oven cavity and a lower space, a door enclosing and sealing the front surface of the cavity against passage of air and microwave energy, a thermal element in the cavity, control means for operation of the thermal element at a normal temperature level for food preparation and at a high level for a self-cleaning mode, the walls of the cavity being insulated, the bottom wall of the cavity having an inlet opening, means defining a cavity air vent at the top of the cavity, a microwave power supply including a blower and a magnetron having cooling fins, the blower having a blower inlet for drawing in cooling air and an outlet for supplying such air

under slight pressure to the cooling fins, a waveguide having an inlet connected to the magnetron and extending under the bottom wall of the cavity to terminate at an outlet, means for connecting the outlet of the waveguide to the inlet opening of the cavity for conduction of microwave energy into the cavity, means defining air passages of limited cross section for conducting air from the magnetron into the waveguide so that a portion of the pressurized air passes through the waveguide and into the cavity for ventilating the cavity when the magnetron and blower are turned on, the blower inlet being located at a level below the bottom wall of the cavity so that when the blower and magnetron are turned off and the thermal element is turned on air is thermally convected from the blower inlet through the air passages

into the waveguide and into the cavity for exiting through the cavity air vent notwithstanding the auto ignition pressure which exists in the cavity under high temperature self-cleaning conditions, the convection path of the air being sufficiently constricted so that air is convected in the self-cleaning mode at a level below that which is capable of producing an explosive reaction with the products of decomposition.

2. In a combined mocrowave-thermal range, the combination comprising a frame having walls defining a rectangular oven cavity and a lower space, a door enclosing and sealing the front surface of the cavity against passage of air and microwave energy, a thermal element in the cavity, control means for operation of the thermal

element within a normal temperature range for food preparation and at a high temperature level for a self-cleaning mode, the walls of the cavity being insulated, the bottom wall of the cavity having an inlet opening, means defining a cavity air vent at the top of the cavity, a microwave power supply having a housing including a magnetron and blower, the blower having a blower inlet and arranged to draw in cooling air for supplying under slight pressure to the magnetron with discharge of at least a portion of the air into the housing to create slight pressure therein, a waveguide having an inlet connected to the magnetron and extending under the bottom wall of the cavity to terminate at an outlet, means for connecting the outlet of the waveguide to the inlet opening of the cavity for conduction of microwave energy

into the cavity, means defining a pattern of small air passages from the housing to the waveguide so at least a portion of the pressurized air from the housing passes through the air passage and waveguide and into the cavity for ventilating the cavity when the magnetron and blower are turned on, all portions of the waveguide and housing including the blower inlet being located at a level below the bottom wall of the cavity so that when the blower and magnetron are turned off and the thermal element is turned on air is thermally convected from the blower inlet through the small air passages and waveguide into the cavity for exiting through the cavity air vent, the convection path of the air being sufficiently constricted so that air is convected in the self-cleaning mode at a level below that which is capable of

producing an explosive reaction with the products of thermal decomposition.

3. In a combined microwave-thermal range, the combination comprising a frame having walls defining a rectangular oven cavity and a lower space, a door enclosing and sealing the front surface of the cavity against passage of air and microwave energy, a thermal element in the cavity, the walls of the cavity being insulated, the bottom wall of the cavity having an inlet opening, means defining a cavity air vent at the top of the cavity, a microwave power supply having a housing including a magnetron and blower, the blower having a blower inlet and arranged to draw in cooling air from outside the housing for supplying under slight pressure to the magnetron, the cooling air being discharged from the magnetron into the

housing for creating internal pressure therin, a waveguide coupled to the magnetron and extending along the housing and under the bottom wall of the cavity, the waveguide having an outlet alined with the opening in the bottom wall of the cavity, a hollow open-ended conductor extending through the opening for coupling the outlet of the aveguide to the cavity, means for securing the upper end of the hollow conductor to the bottom wall of the cavity and the lower end of the conductor to the waveguide for conduction of microwave energy into the cavity, the wall of the waveguide having a pattern of small openings communicating with the housing so that a portion of the pressurized air from the blower and magnetron passes through the waveguide and hollow conductor into the cavity for ventilating the cavity when the magnetron

and blower are turned on, the housing having a relatively large vent opening though which the pressurized air therefrom passes outwardly to reduce the internal pressure in the housing thereby to reduce the flow of air through the pattern of small openings and into the cavity to a predetermined low level, the blower inlet and large vent opening being located at a level below the bottom wall of the cavity so that when the blower and magnetron are turned off and the thermal element is turned on flow of air through the large vent opening is reversed in direction flowing inwardly through such vent opening into the housing and through the small openings via the waveguide into the cavity with final exiting through the cavity air vent.

4. In a combined microwave-thermal range, the combination comprising

a frame having walls defining a rectangular oven cavity and a lower space, a door enclosing and sealing the front surface of the cavity against passage of air and microwave energy, a thermal element in the cavity, the walls of the cavity being insulated, the bottom wall of the cavity having an inlet opening, means defining a cavity air vent at the top of the cavity, a microwave power supply having a housing including a magnetron and blower, the blower having a blower inlet and aranged to draw in cooling air for supplying under slight pressure to the magnetron, a waveguide coupled to the magnetron and extending under the bottom wall of the cavity, the waveguide having an outlet alined with the opening in the bottom wall of the cavity, a hollow open-ended conductor extending through the opening for

coupling the outlet of the waveguide to the cavity, means for securing the upper end of the hollow conductor to the bottom wall of the cavity and the lower end of the conductor to the waveguide for conduction of microwave energy into the cavity, an antenna element centered in the hollow conductor and projecting into the cavity for guiding microwave energy to the latter, means for conducting at least a portion of the pressurized air from the blower and magnetron through the waveguide and hollow conductor into the cavity for ventilating the cavity when the magnetron and blower are turned on, the blower inlet being located at a level below the bottom wall of the cavity so that when the blower and magnetron are turned off and the thermal element is turned on air is convected through the blower inlet, waveguide and hollow

conductor into the cavity for exiting through the cavity air vent at the top thereof.

5. In a combined microwave-thermal range, the combination comprising a frame having walls defining a rectangular oven cavity and a lower space of conforming shape, a door enclosing and sealing the front surface of the cavity against passage of air and microwave energy, a thermal element in the cavity, control means for operation of the thermal element within a normal temperature range for food preparation and at a high temperature level for a self-cleaning mode, the walls of the cavity being insulated, the bottom wall of the cavity having an inlet opening, means defining a cavity air vent at the top of the cavity, a microwave power supply having a housing including a

magnetron and blower, the blower having a blower inlet and arranged to draw in cooling air for discharge under slight pressure to the magnetron, a waveguide having an inlet connected to the magnetron and extending under the bottom wall of the cavity to terminate at an outlet, means for connecting the outlet of the waveguide to the inlet opening of the cavity for conduction of microwave energy into the cavity, the waveguide being open to passage of cooling air from the magnetron so at least a portion of the pressurized air from the blower and magnetron passes through the waveguide and into the cavity for ventilating the cavity when the magnetron and blower are turned on, the blower inlet being located at a level below the bottom wall of the cavity so that when the blower and magnetron are turned off and the thermal

element is turned on air is thermally convected through the blower inlet, magnetron, and waveguide into the cavity for final exit through the cavity air vent at the top thereof, the air passage through the blower, magnetron and waveguide being sufficiently constricted so that the air is convected in the self-cleaning mode at a level below that which is capable of producing an explosive reaction with the products of thermal decomposition.

6. The combination as claimed in claim 5 in which the constriction in the air passage through the blower inlet, magnetron and waveguide is in the form of a pattern of small openings in the wall of the waveguide and in communication with the housing, the openings being of sufficiently small dimension so as to

preclude the escape of microwave energy therethrough.

7. The combination as claimed in claim 6 in which the openings in the wall of the waveguide and the vent opening are sufficiently limited in total area as to limit the flow of air for microwave cookery to within the range of three to eight c.f.m. when the blower is on and to reduce the flow of convected air under baking and self-cleaning conditions to within the range of 0.5 to 2 c.f.m.

United States Court of Appeals for the
Federal Circuit

RAYTHEON COMPANY, Appellee,	)	
v.	)	No. 83-851 83-853
ROPER CORPORATION, Appellant.	)	

O R D E R

A petition for rehearing and a suggestion for rehearing in banc having been filed in this case,

UPON CONSIDERATION THEREOF, it is Ordered by the court that the petition for rehearing be, and the same is hereby, Denied.

The suggestion for rehearing in banc is declined.

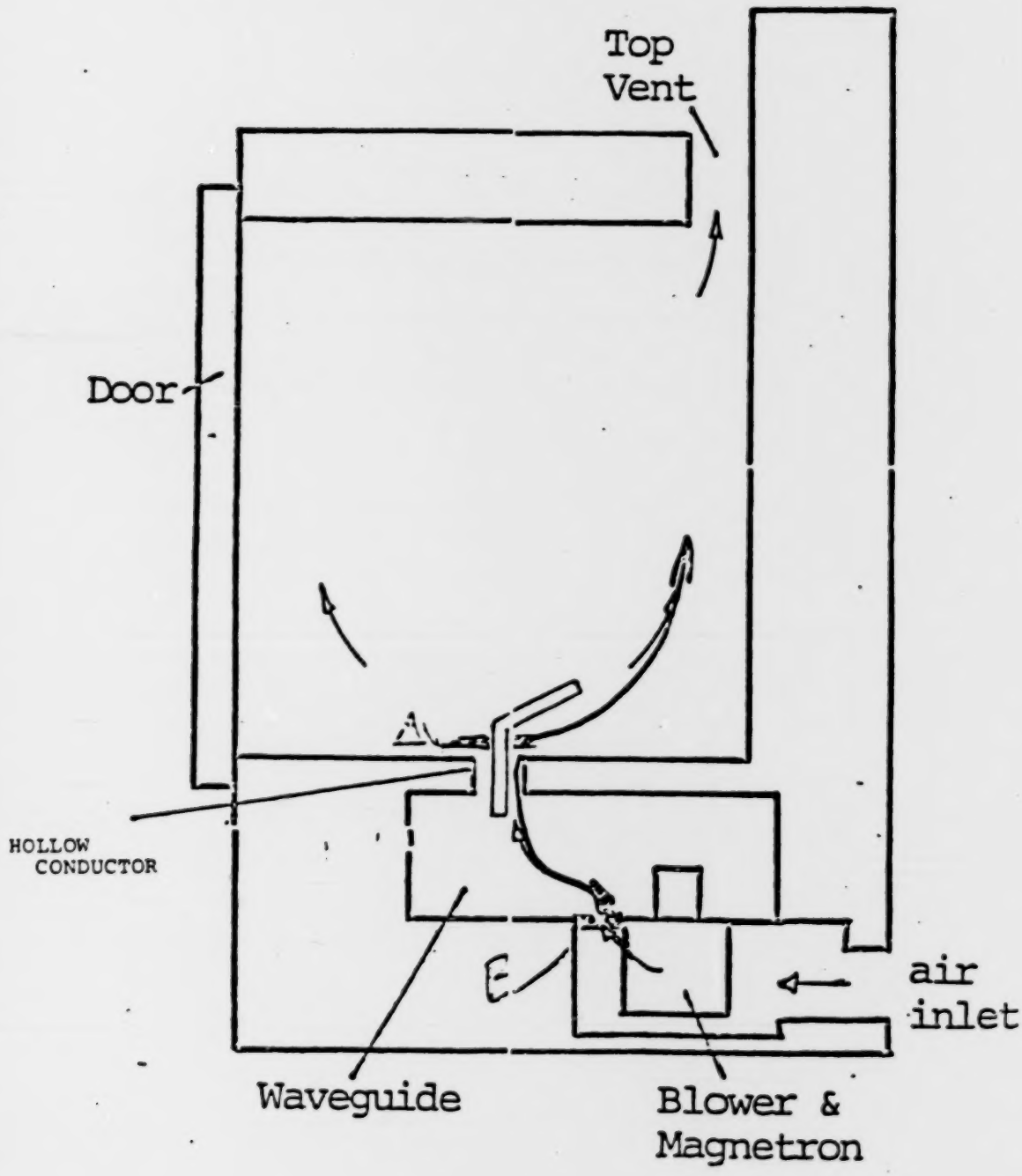
FOR THE COURT

/s/George E. Hutchinson
George E. Hutchinson,
Clerk

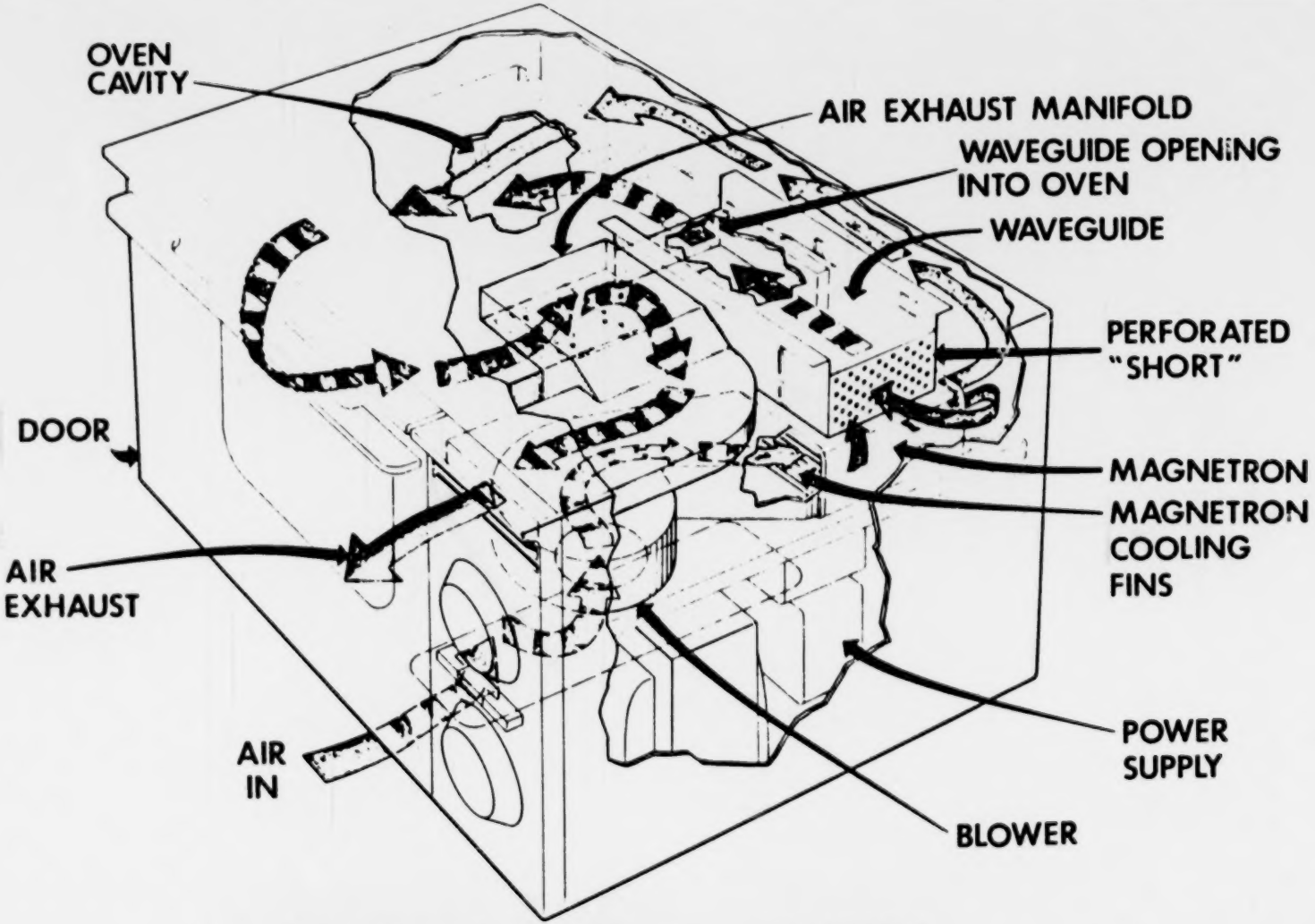
March 1, 1984
Date

cc:Frank P. Porcelli
Martin J. O'Donnell

ROPER'S EXHIBIT NO. 13



ROPER'S OVEN



AMANA RR4 OVEN

B127

ROPER TRIAL BRIEF,
September 30, 1982
(pages 3 - 4)

What severely complicates the situation is the introduction of pyrolytic self-cleaning. The basic thermal breakdown of the oven soil in pyrolysis is done without oxygen. Nevertheless, some air is needed to ventilate the oven during self-cleaning to flush the smoke and other volatile decomposition products produced by pyrolysis out of the oven through the vent located at the top of the oven. An inlet for this air is provided at the bottom of the oven cavity, often by making a gap in the oven door gasket at the bottom. However, because extremely high temperatures are involved, because the gases produced by pyrolysis may be combustible, and because there is some

oxygen present in the oven during self-cleaning, spontaneous combustion may occur right in the oven cavity during self-cleaning, particularly if the oven or the broiler is very dirty. This combustion, which is distinct from oxygen-free pyrolysis, is known as autoignition. When it occurs, it creates sudden increases in pressure within the oven cavity, and this pressure surge can cause smoke and volatile decomposition products to escape from the oven cavity through any opening. Furthermore, if excess air were allowed into the oven during self-cleaning, this autoignition phenomenon might become so aggravated and prolonged as to result in violent explosions.

Autoignition, therefore, is a serious enough concern in a standard self-cleaning oven, and many efforts have

been made to develop flame arresters and anti-flashback devices to protect air entry points into the oven. But it is far more serious in a common cavity oven. Probably the worst possible place for contamination from the smoke and decomposition products of both self-cleaning and autoignition is in the microwave feed system, and in particular the waveguide.

Thus the common cavity oven designer is faced with a dilemma. If the designer wants to incorporate a pyrolytic self-cleaning feature into a common cavity oven, the designer would normally seal up the microwave feed system and either do without adequate venting or find some other, less efficient way to effectuate it. And if the designer chooses to have forced venting through the feed system, he must give up pyrolytic self-cleaning or risk dangerous contamination of the waveguide.

ROPER TRIAL BRIEF,
September 30, 1982
(pages 7 - 8, footnotes omitted)

The Invention

Proceeding directly contrary to the thinking of the previous designers of common cavity ovens with pyrolytic self-cleaning, and to the teaching of the prior art patents that would rule out pyrolytic self-cleaning in an oven that used microwave feed system ventilation, Sumner Torrey, head of the Research Center at Roper, discovered that a pyrolytic common cavity oven could indeed be vented through the microwave feed system, if the system were properly arranged.

Specifically, he discovered that by positioning the microwave feed system below the oven cavity, and providing an air path from an air inlet

below the cavity through the microwave feed system (including the waveguide) and up into the cavity, natural convection would draw air through that path to the oven cavity and up through it to result in sufficient venting of the oven during both thermal cooking and self-cleaning. For reasons not really understood, the waveguide through which convected air flowed would not be fouled by normal autoignition pressures that occur during self-cleaning, even though the waveguide entry location at the bottom of the oven cavity would seem to be a place subject to particularly high contamination.* Based on Mr. Torrey's familiarity with the teachings of the prior art as to ventilating common cavity ovens and as to the problem of autoignition in self-cleaning ovens, the fact that waveguide fouling did not occur in this system came

as a complete surprise to him. In addition, Torrey's new system had the added benefit that the very same air path could be used for forced ventilation of the oven during microwave and combination cooking by using the blower for the magnetron to force air through the waveguide rather than rely on natural convection.**

REQUEST FOR ADMISSION NO. 23

In Roper's common cavity oven, backflow from the oven cavity to the waveguide is not prevented during auto ignition.

*****

RESPONSE

Denied. Such backflow is prevented, so that fouling does not occur, in normal self-cleaning even if auto ignition does occur. Also, such backflow is prevented so that fouling does not occur, even if the soil load is heavy. Backflow, however, may occur under some abnormally heavy conditions involving extremely heavy loads such as those used by U.L to test for fire and explosion hazards.

DEPOSITION TRANSCRIPT OF ROBERT D. TRIPLETT
Exhibit 265
(Page 58, line 14 to page 59, line 16)

Q. Well, in your discussions with those who were working on the design of the common cavity oven, did you discuss the position of the microwave feed?

A. Yes.

Q. And what was the substance of those discussions?

A. As far as I can recall, all of those discussions for product considerations or proposals were bottom fed.

Q. Were any reasons given to you for feeding from the bottom?

A. The one I recall of real merit was most eco-omical approach to the design.

Q. And it was the most convenient place to position it?

A. The most economical.

Q. Economical in what respect?

A. Manufacturing costs.

Q. Is that because there was space beneath the oven cavity to position the feed?

A. Yes.

Q. And it would be less economical, for example, to position it in back of the oven or at the top?

A. Yes.

Q. In terms of manufacturing costs?

A. Yes.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 2, page 34, lines 17 - 19)

A . . . The microwave feature by itself is not significantly different than what one might find in the prior microwave art.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 5, page 152, line 21 to page 153, line 4)

Q When operating in the microwave mode, your air flow system does not operate any differently, for example, than the RR4 oven when operating in the microwave mode, does it?

A Physically it operates no differently. The air entry point is at the bottom of the oven and one is at the top.

Q And that's the only difference, isn't it?

A Correct.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 1, page 142, line 18 to page 143, line 8)

Q Now, let's say you shut the blower off and if Boehm is suggesting you would get fouling, what is so bad about fouling?

A Fouling in the pyrolytic mode can be severe. Boehm is concerned about it just with cooking vapors, and in the self-cleaning modes you are dealing with not just grease but grease which can be raised to a high temperature and ignite within the waveguide, or you are dealing with excess air and explosions that are forcing materials back in there, such as carbon that can be generated during the cleaning

process, and I have sort of indicated what those sorts of problems can do. They can be very, very detrimental to the waveguide feed, much more so I believe than Boehm, and damage the components within the oven, as well as the magnetron and waveguide.

TRIAL TRANSCRIPT
WITNESS: HURKO
(Vol. 8, page 33, line 2 to page 34, line 18)

Q What is autoignition?

A Well, in the oven during this process, sometimes there is a right combination of air, pressure, and combustion products and temperature. And this movement flows out the ignition. So it ignites this product. It's just like to say in motor, in the motor in the car.

Q You say in a car ignition?

A Yes, in cylinder.

Q What causes ignition in the car?

A Well, the spark.

Q The spark?

A But, say, the process is similar. Now following ignition is sudden temperature

rise and pressure rise. And you may qualify this like explosion.

Q In other words, the autoignition is the beginning of the process?

A Yes.

Q When it ignites?

A When it starts.

Q And followed by an increase in pressure?

A Yes.

Q And you term that an explosion?

A Yes.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 4, page 52, line 9 to page 53, line 25)

Q Let's say as of January 1, 1974, were there waveguide dump systems which had waveguides which allowed microwave energy into an oven cavity through an opening in the waveguide directly into the cavity and through which air also passed?

A Yes.

Q And whose systems were those, who manufactured product containing that feature?

A Amana employed that method.

Q And do you know, can you name any specific products of Amana which employed that method as of that time?

A You mean by model number?

Q Yes, or any other designation by which we could perhaps recognize it, name it.

A I believe their RR4, for example, but that's only because I heard the number. I have a hard enough time with our own model numbers.

Q You are familiar with the RR4, in fact, aren't you?

A I was at one time.

Q And in fact, you were familiar with it at least as early as 1973, weren't you?

A I can't recall the date.

Q You were familiar with it prior to the time that you began development work on common cavity microwave ovens, weren't you?

A I believe that to be the case, yes.

Q And you had examined in detail an RR4 oven, hadn't you?

A I wouldn't say I examined it in detail, but I knew how it operated, yes.

Q And in fact, you had one at the Purdue Research Center didn't you?

A I suspect so. I don't know for sure, but I expect that we did at one time.

Q And it was there for the purpose of seeing how it operated, wasn't it?

A We had that, as well as other competitor products that we would operate from a cooking mode standpoint and examine them from that aspect.

Q And would normally also disassemble them to examine their

construction and internal operations?

A Yes.

TRIAL TRANSCRIPT
ROPER OPENING STATEMENT
(Vol. 1, page 11, line 3 to page 12, line 6)

Now, it was conventional thinking, up to the time that Torrey came along, that you could not have an open waveguide; that is, with its open end into the oven, if the oven were going to have a self-cleaning feature, because it was known universally, that during the self-cleaning cycle, the products of the pyrolytic treatment would back up into the waveguide, and there would be a build-up possibly of carbon and other materials which would interfere with the passage of the microwaves.

Indeed, during the self-cleaning pyrolysis cycle, sometimes with a heavy load of soil, flames will appear inside the oven, and that is one of the

reasons, of course, that in all these ovens with self-cleaning features, there is an interlock on the door so the housewife cannot open the door when self-cleaning is in progress, because if the door will open, there might be an explosion from the gases inside.

Now, that phenomenon of possible burning or possible flaming during part of the cycle, which doesn't always occur -- sometimes it does, sometimes it doesn't -- is called auto ignition. That is another term which will be used by the witnesses. If there is autoignition, it is believed that substantial build-up of pressure within the cavity occurs, and that was thought would force the products of combustion down into the waveguides; therefore, it was felt you could not have an open waveguide...

TRIAL TRANSCRIPT
ROPER COUNSEL COLLOQUY WITH COURT
(Vol. 1, page 66, line 21 to page 67, line 11)

The other thing is that perhaps I didn't make it clear that if you have a steam problem in a combination microwave oven and you solve it by letting air in through the waveguide, the industry thought the waveguide would be in jeopardy of being contaminated and said: Don't do it. Whereas, if you solve the waveguide noncontamination problem by closing it up, you can't ventilate. So that is the dilemma that Mr. Torrey solved.

THE COURT: I understand that is the initial issue, that is, was there a problem, and, if there was no problem, it is going to make this rather easy. It might make it rather easy if it

is a problem. I want to get in on the issue that I can most easily understand and deal with at the beginning. That is the issue: Was there a problem?

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 1, page 140, lines 2 - 18)

Q How would self-cleaning cause this contaminating material to go into the waveguide if you shut the blower off? At least, how was that thought to occur?

A The pressures develop due to autoignition.

Q What is autoignition?

A Autoignition is essentially a combusion (sic) producing very high pressures, unusually high, sometimes caused by burning within the oven. The burning can produce gases and smoke. And the smoke aspect also has a pressure head to it. And either one of these two can force vapors back into the oven during the

-- or back into the waveguide system in this case, during the cleaning process.

Q Which is more safer, the problem of convection flow during cooking back into the waveguide or the self-cleaning backflow problem?

A The problem with self-cleaning ovens is far worse.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 2, page 69, lines 3 - 18)

Q What does your patent teach with respect to autoignition, if it's not teaching eliminating autoignition?

A It teaches a way of living with that such that you essentially restrict or -- I guess I'm grasping for the word -- reduce the pressure. I don't want to get too technical. To backflow or flow that would go into the waveguide and create fouling.

So there is a pressure restriction within the system that we teach to prevent autoignition from fouling the waveguide, providing that autoignition is within the normal levels of consumer soils.

Q Is this a fair characterization of what you are saying, what is on Column 1 of your patent at Line 42?

A Yes, it is more specific, obviously, to provide a ventilation system which is capable of reducing autoignition pressure of the --

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 1, page 120, lines 1 - 11)

Q Which of the two, can you say which of the two is more important, the cooking vapors or self-cleaning vapors as far as keeping them out?

A Definitely self-cleaning vapors.

Q And why is that?

A Because they have far more hazards associated with the self-cleaning vapors as I indicated earlier, problems of grease and fire hazards are much more significant there.

Products of decomposing products, such as carbon, is more significant in that aspect and the problem of redeposition would be far worse.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 1, page 128, lines 13 - 20)

Q So what is the real difference as far as heat between the self-cleaning and normal cooking?

A Well, the temperature is basically the only difference. The problem really deals with the food deposits that are left in the oven cavity or deposited on the oven cavity and decomposed during the process, and this is a far more significant problem from the fouling standpoint than is normal cooking vapor.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 2, page 4, lines 14 - 20)

Q Well, why don't you just turn the blower off in a self-cleaning oven?

A The self-cleaning oven would not function with the blower being turned off from the standpoint of the reactions that take place are very high pressure and it would back up into the waveguide if it's open to the oven.

TRIAL TRANSCRIPT
ROPER COUNSEL COLLOQUY WITH COURT
(Vol. 1, page 66, line 21 to page 67, line 4)

The other thing is that perhaps I didn't make it clear that if you have a steam problem in a combination microwave oven and you solve it by letting air in through the waveguide, the industry thought the waveguide would be in jeopardy of being contaminated and said: Don't do it. Whereas, if you solve the waveguide noncontamination problem by closing it up, you can't ventilate. So that is the dilemma that Mr. Torrey solved.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 1, page 142, line 13 to page 143, line 8)

Q Does this present a dilemma, if you follow the teachings of the Boehm and French patents?

A It definitely presents a dilemma if we follow the teachings of this compared to the self-cleaning oven teachings before and the self-cleaning oven needs.

Q Now, let's say you shut the blower off and if Boehm is suggesting you would get fouling, what is so bad about fouling?

A Fouling in the pyrolytic mode can be severe. Boehm is concerned about it just with cooking vapors, and in the self-cleaning modes you are dealing with not just grease but grease

which can be raised to a high temperature and ignite within the waveguide, or you are dealing with excess air and explosions that are forcing materials back in there, such as carbon that can be generated during the cleaning process, and I have sort of indicated what those sorts of problems can do. They can be very, very detrimental to the waveguide feed, much more so I believe than Boehm, and damage the components within the oven, as well as the magnetron and waveguide.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 2, page 5, line 13 to page 8, line 6)

Q What was your solution to the problem? What was your invention?

A My invention was, basically, to locate the feed system at the oven bottom such that when you opened the air inlet and brought convective air in through the waveguide and expelled that air out through the normal vent system, the catalytic vent system, in a manner that did not foul the waveguide.

I could expand on this by indicating that once that discovery was made, we actually could have convected air flow through the oven that we could apply the blower and force air through the waveguide and

expell steam from the oven. This solved essentially all three problems that we were dealing with.

Q So how did it solve all three problems?

A It solved the problems of limiting the amount of air through the waveguide and properly expelling that out the catalytic vents such that smoke and reactions that went on in the oven were contained within the oven and the by-products of self-cleaning were expelled from the vent without any other associated problems of smoke or flame.

Q Was that because the blower was on or off?

A That's because the blower was off.

Q Okay.

A The steaming problem was solved strictly by the forced air flow with

the blower on to remove oven vapor through that same microwave feed passage and vent system to expell the vent, or, the steam in the manner that wouldn't be a consumer hazard.

The fouling of the waveguide, I believe, basically, was solved by the location of the waveguide and the fact that we had constricted air flow through that in an inlet well below the oven bottom, that the discovery indicated did not cause waveguide fouling.

Q Would placement of the feed at the bottom have been likely to have been better with respect to preventing fouling?

A It would appear,based on the teachings and my own knowledge of the product, the location on the

oven bottom perhaps would be worse than any other place in the oven due to the fact that most of the soil appears or is accumulated on the oven bottom.

Q So as opposed to somewhere else in the oven, you're saying what about putting the feed at the bottom and making it open?

A I'm saying, basically, that goes counter to all of the teachings that I saw and everything that I thought about how to deal with these problems. I did realize that if the opening were at a higher location that there would be a strong tendency by natural convection to force both cooking vapors and the by-products of combustion into that waveguide system from a natural convection standpoint, or force.

Q With respect to the problem in self-cleaning that you mentioned yesterday of autoignition, what about the placement at the bottom of the waveguide opening, would that likely cure it?

A It did not appear to me from a thought process standpoint prior to trying it that it would cure it, but apparently it did resist the pressures involved, such that it didn't foul.

Q What was your reaction when you saw it did resist the pressures of fouling?

A I was quite surprised and felt we had finally a solution to all three problems.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 2, page 74, lines 9 -20)

Q How can that be? How can this tiny pressure coming through the waveguide resist this big autoignition pressure?

A Well, I know autoignition exists, and the only theory that I've ever been able to deal with or resolve the problem deals with a fact that in the normal use, the energy content is so small that perhaps this pressure may not be great enough to overcome it, but it still does not seem reasonable to me, thus I'm in a quandary. All I know is we do not foul or waveguide because there is resistence in the system to autoignition pressures.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 2, page 75, lines 4 - 11)

Q Are you saying a combination at the bottom plus the convection?

A The bottom of the oven plus the convection, locations, and the way it's arranged. I'm not really saying convection, probably just the fact that it's limiting air entry and may provide some kind of a pressure chamber which prevents it from backing up into that waveguide.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 2, page 83, line 22 to page 84, line 25)

THE WITNESS: Pardon me?

THE COURT: You can't measure the air coming through?

THE WITNESS: We measure the flow rate, the pressures are very difficult to measure, and so you can only deal with them by equations or theory.

In other words, you can measure how much air is flowing in terms of CFM, but it's extremely difficult to measure the convected air flow in this oven because it is so small. It is on the order of inches of water. We measure blower pressures involved very accurately. In other words, the air pressure the blower generates.

THE COURT: You can measure that, but you can't measure the naturally convected air through that?

THE WITNESS: It is very difficult to measure. It is a case of trying to take a -- I don't know if we ever really tried to absolutely measure it -- but it is essentially a very, very low number, just based on equation and theory relative to what the pressures and temperatures are.

THE COURT: But somehow there is a balance in there? Somehow, however it happened, you have managed or this system manages to allow enough air to go through so that it resists air coming down and fouling the waveguide, correct? It resists a backup?

THE WITNESS: In normal cooking.

THE COURT: And self-cleaning?

THE WITNESS: Normal, after normal food soil and going through a self-cleaning process, I believe there is a restriction that prevents that which means that whatever the backkup pressures are, they are apparently either diminished so quickly or not large enough that still the convection system works.

THE COURT: You say in the self-cleaning mode, there was pressure in every --

THE WITNESS: In every direction.

THE COURT: In every direction.

So, therefore, there would be pressure down into the waveguide?

THE WITNESS: Yes.

THE COURT: Somehow that pressure becomes resisted or dissipated?

THE WITNESS: Correct.

THE COURT: And the only explanation is from the convected air up through the waveguide, there is no other explanation for that, is there?

THE WITNESS: I don't believe there is any other real good explanation. At the same time, it surprises me.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 2, page 85, lines 1 - 17)

THE COURT: Yes, I understand it. You may not know how it works, and that many not make any difference; but something is happening to resist the downward pressure into the waveguide. At the same time, if I understand you, this naturally convected air is not so large as to add to the pressures already in the cavity to provide more -- to provide an explosion due to the greater increases in air.

You see what I mean? It prevents autoignition. It doesn't prevent it, it doesn't help it.

THE WITNESS: It doesn't prevent it, but there is no dangerous condition caused when it occurs.

THE COURT: So it is so low it can't assist in the production of autoignition and, yet, it is high enough to resist the effect of that autoignition downward into the guide?

THE WITNESS: I could buy that.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 5, page 56, line 13 to page 57, line 16)

[Q] What does Newton's law tell you under those conditions? When you have two pressures diametrically opposed to each other, one of which is up to 100 times as great as the other, what does Newton's law tell you about the direction in which matter will go?

A One would expect the greater pressure to dominate, the motion would go in the direction of the greater pressure.

Q In other words, you would expect the materials flow right into that waveguide from the oven through the aperture A?

A This is what I expected and was concerned about from the very

beginning of how to treat convected flow rate in a common-cavity pyrolytic oven.

Q This is a fundamental exception to Newton's laws that you have discovered, isn't it?

A I don't consider it a fundamental exception.

Q One unit of pressure can resist 100 units of pressure, that's fundamental, isn't it? This is the first time there has been such an extraordinary exception in nonrelativistic physics?

A You are dealing with fluidic theory, or whatever theory you want to, I am just saying that we have a system that apparently --or does -- resist fouling, redeposition in spite of all that we have been discussing here. And I don't know how it

works. I have said I don't know how it works.

All I know is it works.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 5, page 58, lines 5-20)

[Q] Have you written any papers to teach the scientific community or engineering community about this very fundamental exception to the basic laws of physics that you have discovered?

A Obviously not. I have a patent, and that is the only thing that has been written that I know of.

Q Have you tried to explore it? Have you tried to test it?

A No.

Q You haven't done any measurements, have you, which would give any substance or credence to your theory that a pressure of one-tenth of a pound per square inch can somehow,

mysteriously, magically, outweigh a pressure of 100 pounds -- 14 to 100 pounds per square inch, have you?

A No.

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 3, page 105, lines 1 - 22)

Cross Examination by Mr. O'Donnell

Q Mr. Torrey, I take it that you now admit that the air vent system that you say you have developed now does not prevent all backflow down through the waveguide from the oven cavity, is that correct? We don't have any more question about that now, do we?

A I have no question about the fact thatit (sic) does prevent. It's just a case of what the conditions are that it prevents.

Q Does it prevent all backflow into that waveguide?

A Obviously it does not prevent all backflow from a standpoint of UL conditions.

Q Does it prevent all backflow into that waveguide, Mr. Torrey?

A As far as I am concerned from the interpretation of the patent, it takes care of all backflow in the waveguide.

Q Is backflow physically prevented into that waveguide?

A I believe there is resistance to the autoignition in the reaction to take place in the oven.

TRIAL TRANSCRIPT
ROPER OPENING STATEMENT
(Vol. 1, page 11, lines 3 - 12)

Now, it was conventional thinking, up to the time that Torrey came along, that you could not have an open waveguide; that is, with its open end into the oven, if the oven were going to have a self-cleaning feature, because it was known universally, that during the self-cleaning cycle, the products of the pyrolytic treatment would back up into the waveguide, and there would be build-up possibly of carbon and other materials which would interfere with the passage of the microwaves.

TRIAL TRANSCRIPT
ROPER OPENING STATEMENT
(Vol. 1, page 11, line 22 to page 12, line 6)

Now, that phenomenon of possible burning or possible flaming during part of the cycle, which doesn't always occur -- sometimes it does, sometimes it doesn't -- is called auto ignition. That is another term which will be used by the witnesses. If there is autoignition, it is believed that substantial build-up of pressure within the cavity occurs, and that was thought would force the products of combustion down into the waveguides; therefore, it was felt you could not have an open waveguide...

TRIAL TRANSCRIPT
WITNESS: TORREY
(Vol. 5, page 2, line 1 to page 5, line 23)

SUMNER H. TORREY, Resumed

CROSS-EXAMINATION BY MR. O'DONNELL, Continued

Q Mr. Torrey, will you please tell us what you mean by backflow?

A By backflow I mean the products within the oven cavity such as air, vapors, and in the case of self-cleaning, products of degradation can be, shall we say, pushed back into an air entry system into that cavity.

Q How about a waveguide?

Now, let's assume for the moment, let's accept your statement at face value for some unexplained

reason the air and vapor which we will just call generically vapor including air and all the other products that may be in the oven, grease, et cetera -- let's assume for some reason the vapor doesn't flow into the waveguide as you tell us, but if it did, would that be backflow?

If vapor did come into the the waveguide from the oven, would you call that backflow?

A If you would define "vapors" as any contaminants in the oven whatever, yes.

Q Air, grease --

A I would say collectively, not individually.

Q Okay.

So we'll understand vapors

to include whatever is in the oven, not referring to any separate part but whatever is in the oven at any particular time, is that fair enough?

A Well, self-clean, in the self-cleaning mode dominantly.

Q Thermal mode, also, vapors are in the thermal mode?

A Correct.

Q And there are present vapors in the self-cleaning mode?

A Yes.

Q If any of those vapors were to flow back into the waveguide, would you say that is backflow?

A Yes.

Again, I didn't hear the word "particulates," but if that's included, yes.

Q So if anything comes from the oven into the waveguide, you would consider that backflow, is that correct?

A Not "anything," but anything that's a contaminant.

Q What would you consider coming back into the waveguide that would not be backflow?

A I would see nothing harmful about air, nothing harmful about vapors that don't cause fouling.

Q In your definition of the word, the term "backflow," you exclude anything that might cause fouling, is that correct?

I'm sorry, includes only that which could cause fouling and excludes everything else?

A I believe that's the essence of the invention is to prevent fouling.

Q Now, is there some mechanism which separates the harmful constituents, that is those constituents which would lead to fouling, from those constituents which would not lead to fouling?

Is that another magic feature of this invention?

A When you are talking about "mechanism," I really don't know how the invention works, and, therefore, I have a difficult time answering that specific question.

Q Do you believe that there is anything in the air flow system that you say you developed that separates out from entry into the waveguide constituents which would cause fouling from constituents which would not cause fouling?

A I believe there is a resistance, but I can't define the mechanism that does any separation, no.

Q There is no differential resistance to the various constituents, is there?

There is nothing you have incorporated that would cause you (sic) waveguide to resist entry of one product more than another, isn't that correct?

A That's correct.

Q So that if anything from the oven comes into the waveguide, you have a backflow into the waveguide, don't you?

A Would you repeat the question, please?

Q If anything from the oven comes into the waveguide, you have a backflow, don't you?

A In that condition, yes.

Q Whether or not that backflow contains vapors that would cause fouling, it is a backflow, isn't it?

A Yes.

Q And there is nothing in your invention that prevents that backflow, is there?

A I'm not sure that there isn't anything in the invention. The fact that we do not get vapors indicates there is some mechanism in there -- or fouling of the waveguide, I should say -- indicates some mechanism exists that prevents that.

Q Do you know of any such mechanism? Can you identify any such mechanism?

A I theorized it could be the convected flow as a resisting means, I have also indicated it could be the fact that there is some vertical

shielding in the inside of the oven cavity relative to any vertical direction of backflow impacting on the bearing cover.